153771 Acetylene N.

MG Industries™

2460 Boulevard Of The Generals
P.O. Box 945
Valley Forge, Pennsylvania 19482

EMERGENCY PHONE
800-345-6361
800-362-0534 (in PA)

MATERIAL SAFETY DATA SHEET

100

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0002

PRODUCT NAME Acetylene	CAS # 74-86-2
TRADE NAME AND SYNONYMS Acetylene, Ethyne	DOT I.D. No.: UN 1001
CHEMICAL NAME AND SYNONYMS Acetylene	DOT Hazard Class: Flammable gas
ISSUE DATE AND REVISIONS 25 November 1985	Formula: C_2H_2
	Chemical Family: Alkyne

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Acetylene is defined as a simple asphyxiant. Oxygen lev should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg. (ACGIH, 1985-86)

SYMPTOMS OF EXPOSURE

Inhalation: Low concentrations (10-20% in air) cause symptoms similar to that of being intoxicated. Higher concentrations so as to exclude an adequate supply of oxygen to the lungs cause unconsciousness.

TOXICOLOGICAL PROPERTIES

As a narcotic gas or intoxicant causes hypercapnia (an excessive amount of carbon dioxide in the blood). Repeated exposures to tolerable levels has not shown deleterious effects. The major property is the exclusion of an adequate supply of oxygen to the lungs.

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO ACETYLENE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Flammable over an extremely wide range in air. Explosive reactions may occur on ignition. Reacts explosively with halogens and halogenated compounds.

PHYSICAL DATA

BOILING POINT Sublimation point = -118.8°F (-83.8°C)	LIQUID DENSITY AT BOILING POINT @ -116°F (-82°C) = 38.8 lb/ft^3 (622 kg/m^3)
VAPOR PRESSURE @ 70°F (21.1°C): 645 psia (4450 kPa)	GAS DENSITY AT 70°F. 1 atm .0691 lb/ft^3 (1.107 kg/m^3)
SOLUBILITY IN WATER Soluble	FREEZING POINT -113°F (-80.6°C)
EVAPORATION RATE N/A	SPECIFIC GRAVITY (AIR=1) @ 68°F (20°C) = 0.906

APPEARANCE AND ODOR Pure acetylene is a colorless gas with an ethereal odor. Commercial (carbide) acetylene has a distinctive garlic-like odor.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) Gas	AUTO IGNITION TEMPERATURE 565°F (296°C)	FLAMMAGLE LIMITS % BY VOLUME See last page LEL 2.2 UEL 80-85

EXTINGUISHING MEDIA: Carbon dioxide; dry chemical

ELECTRICAL CLASSIFICATION: Class 1, Group A

SPECIAL FIRE FIGHTING PROCEDURES

If possible, stop flow of escaping gas. Use water spray to cool surrounding containers. Keep personnel away since heated or burning cylinders can rupture violently.

UNUSUAL FIRE AND EXPLOSION HAZARDS GASEOUS ACETYLENE IS SPONTANEOUSLY COMBUSTIBLE IN AIR AT PRESSURES ABOVE 30 PSIA (207 kPa). It requires a very low ignition energy so that fires which have been extinguished without stopping the flow of gas can easily reignite with possible explosive force. (Continued on last page.)

REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable	X	Do not allow the free gas (outside of cylinder) to exceed 30 psia. Cylinders should not be exposed to sudden shock or sources of heat.
Stable		

INCOMPATIBILITY (Materials to avoid) Oxygen and other oxidizers including all of the halogens and halogen compounds. (Continued on last page.)

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon and hydrogen

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		
Will Not Occur	X	N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein.

WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

VENTILATION	LOCAL EXHAUST	SPECIAL
Hood with forced ventilation.	To prevent accumulation above the LEL.	N/A
	MECHANICAL (Gen.) In accordance with electrical codes.	OTHER N/A

PROTECTIVE GLOVES
PVC or rubber in laboratory; as required for cutting and welding.

EYE PROTECTION
Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT
Safety shoes, safety shower

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT Shipping Name: Acetylene DOT Hazard Class: Flammable gas
DOT Shipping Label: Flammable gas I.D. No.: UN 1001

SPECIAL HANDLING RECOMMENDATIONS
Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when removing gas from the cylinder. DO NOT ALLOW THE FREE GAS TO EXCEED 30 PSIA (207 kPa) @ 70°F (21.1°C). Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional recommendations, consult Compressed Gas Association's Pamphlets G-1, P-1, P-14 and Safety Bulletin SB-2.

SPECIAL STORAGE RECOMMENDATIONS
Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders must be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no sources of ignition in the storage or use area.

For additional recommendations, consult Compressed Gas Association's Pamphlets G-1, P-1, P-14, and Safety Bulletin SB-2.

SPECIAL PACKAGING RECOMMENDATIONS Since acetylene will explode or combust if its pressure exceeds 30 psia (207 kPa) it is shipped dissolved in acetone or dimethylformamide which is dispersed in a porous mass within the cylinder. Follow your supplier's instructions for the maximum withdrawal rate for each size cylinder so that solvent is not withdrawn with the acetylene.

Most metals except silver, copper, mercury or brasses with more than 66% copper are compatible (non corrosive) with acetylene.

OTHER RECOMMENDATIONS OR PRECAUTIONS
Earth-ground and bond all lines and equipment associated with the acetylene system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

MG

PRODUCT: Acetylene

DOT CLASS: Flammable Gas

REQUIRED LABELS: Flammable Gas

U.N. NO.: 1001 SYNONYMS:

AUTOIGNITION TEMP: 581 °F VAPOR DENSITY (AIR=1): 0.9

FLAMMABILITY LIMITS: Upper 100 Lower 2.5

HAZARD ID: Health 1 Flammability 4 Reactivity 3

FIRE OR EXPLOSION

Extremely flammable. May be ignited by heat, sparks and flame. Flammable vapor may spread away from spill. Container may explode violently in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers.

HEALTH HAZARDS

If inhaled, may be harmful. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes. Contact with liquid may cause frostbite. Fire may produce irritating or poisonous gases.

EMERGENCY ACTION

Keep unnecessary people away. Stay upwind; keep out of low areas. Isolate hazard area and deny entry. Wear self contained breathing apparatus and full protective clothing. Isolate for ½ mile in all directions if tank or tankcar is involved in fire. For EMERGENCY CALL CHEMTREC (800) 424 9300.

FIRE Let burn unless leak can be stopped immediately. For small fires, use dry chemical or CO_2. For large fires use water spray, fog or foam. Move container from fire area if you can do so without risk. Stay away from ends of tank. For massive fire in cargo area, use unmanned hose holder or monitor nozzles. If this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or discoloration of tank. Cool container with water using unmanned device until well after fire is out.

SPILL OR LEAK No flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Use water spray to reduce vapors. Isolate area until gas has dispersed.

FIRST AID Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of frostbite, thaw frosted parts with water. Keep victim quiet and maintain normal body temperature.

International Alloy Steel
30403 Bruce Industrial Parkway
Solon, Ohio. 44139. U.S.A.

Material Safety Data Sheet

Alloy Steel Bars Pipes, Plates

1. PRODUCT IDENTIFICATION

MANUFACTURER'S NAME:	PREPARED BY:
Various	International Alloy Steel 30403 Bruce Industrial Parkway Solon, Ohio 44139
COMMON NAME: Alloy Steel Bars, Pipes, Plates	ISSUE (REVISION) DATE: May 20, 1986

PRODUCTS/TRADE NAMES: Firmex Bars & Plates; Nataloy Bars; Firmex Keystock; Firmang Bars & Plates; Firmkrom; Firmex Wear Pipe 600

2. HAZARDOUS INGREDIENTS

STEEL PRODUCTS UNDER NORMAL CONDITIONS DO NOT PRESENT AN INHALATION, INGESTION OR CONTACT HEALTH HAZARD.

C A S NUMBER	BASE METAL & ALLOYING ELEMENTS(10)		% BY WEIGHT(2)	ACGIH-TLV (mg/m3)	OSHA PEL (mg/m3)
7439-89-6	Iron	(Fe)	> 95	5. as iron oxide	10. as iron oxide
7440-02-0	Nickel*	(Ni)	< 5	1. as soluble compd.	1. as soluble compd.
7440-47-3	Chromium*	(Cr)	< 5	0.5 as Cr metal	1.0 as Cr. metal
7440-21-3	Silicon	(Si)	< 5	5. respirable dust	None established
7439-96-5	Manganese	(Mn)	< 2	1. as fume;5. as dust	5. as dust & fume
7440-44-0	Carbon	(C)	< 2	None established	None established
7439-98-7	Molybdenum	(Mo)	< 2	5. as soluble compds. 10.as insoluble compds.	5. as soluble compds. 15.as insoluble compds.
7440-62-2	Vanadium	(V)	< 2	0.5as dust & fume	0.5as dust;0.1 as fume
7429-90-5	Aluminum	(Al)	< 2	10. 12 dust,5. as fume	None established
7704-34-9	Sulfur	(S)	< 2	5. as sulphur dioxide	13.as sulphur dioxide
7723-14-0	Phosphorus	(P)	< 1	0.1 as phosphorous	0.1 as phosphorous
7440-42-8	Boron	(B)	< .01	10. Boron oxide	15. Boron oxide
7440-50-8	Copper	(Cu)	< 1	0.2as fumes;1.0as dust	0.1as fume;1.0 as dust

*NICKEL, CHROMIUM & THEIR COMPOUNDS ARE LISTED AS CARCINOGENS IN THE THIRD ANNUAL REPORT ON CARCINOGENS AS PREPARED BY THE NATIONAL TOXICOLOGY PROGRAM.

(1) Steel pfoducts contain trace (residual) quantities of various elements (less than .2%) which normally originate in the raw material used.
(2) %'s of alloying elements vary with product type.
(3) 1985-1986 ACGIH threshold limit values.

3. PHYSICAL DATA

MATERIAL IS: Solid under normal conditions
APPEARANCE AND ODOR: Gray/Black-odorless
MELTING POINT (BASE METAL): 2650° to 2750°F

4. FIRE AND EXPLOSION DATA

STEEL PRODUCTS IN SOLID STATE PRESENT NO FIRE OR EXPLOSION HAZARD

5. HEALTH HAZARD DATA

EFFECT OF OVEREXPOSURE

Acute: Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever." Though metals such as Copper and Zinc have been most associated with metal fume fever, it is suspected by some authorities that other metallic fumes may produce this condition. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in the mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever and chills.

Chronic inhalation of high concentrations of iron oxide fumes and dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Excessive exposure and repeated inhalation of Chromium fumes or dust may cause severe irritation, ulceration or cancer in the respiratory system-nose, throat and lungs. It is generally believed that the hexavalent forms of Chromium (Cr+6) are responsible for these effects. Excessive exposure and inhalation of Nickel fumes has been associated with respiratory cancer. Both Chromium and Nickel are sensitizers and may cause allergic reactions.

6. EMERGENCY FIRST AID INFORMATION

MAJOR EXPOSURE HAZARD:	EMERGENCY FIRST AID
INHALATION:	Remove to fresh air; if condition continues, consult physician.
EYE CONTACT:	Flush well with running water to remove particulate and get medical attention to ensure particle has been completely removed.
SKIN CONTACT:	Brush off excess dirt; wash area well with soap and water.
INGESTION:	Seek medical help if large quantities of material have been ingested (ingestion of significant amounts of metal is unlikely).

7. REACTIVITY DATA

STABLE under normal conditions of use, storage and transport.
REACTS WITH strong acid to liberate hydrogen.
HAZARDOUS DECOMPOSITION-at temperatures above the melting point, may liberate fumes containing oxides of iron and alloying elements.
AVOID: Non-ventilated areas during welding, burning, grinding, machining, etc. Metallic fumes and dusts may be produced.

8. SPILL, LEAK OR DISPOSAL INFORMATION

Not applicable to steel in the solid state.

9. SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS: Use general or local exhaust to keep airborne concentrations of dust and fumes below the TLV, when welding, burning, sawing, brazing, grinding, machining, etc.

RESPIRATORY PROTECTION: Provide NIOSH/MSHA approved dust and fume respirators to avoid excessive inhalation of particulates. Appropriate respirator selection depends on amount of exposure.

SKIN PROTECTION: Gloves &. barrier creams may be necessary to prevent skin sensitization and dermatitis. Protective gloves should be worn as required for welding, burning, handling or other operations.

EYE PROTECTION: Safety glasses, goggles or face shields should always be worn when grinding, sawing, brazing, machining, welding or burning.

OTHER PROTECTIVE EQUIPMENT: As required, to control exposure.

SPECIAL PRECAUTIONS: Avoid breathing metal fumes and/or dusts. Operations with the potential for generating high concentrations of airborne particles should be evaluated and controlled as required.

INTERNATIONAL ALLOY STEEL

AMMONIUM PERSULFATE 0008

J. T. BAKER CHEMICAL CO. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

EFFECTIVE: 09/27/85 ISSUED: 01/24/86

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0008

SECTION I - PRODUCT ID

PRODUCT NAME: AMMONIUM PERSULFATE
FORMULA: (NH4)2S2O8
FORMULA WT: 228.20
CAS NO.: 07727-54-0
NIOSH/RTECS NO.: SE0350000
COMMON SYNONYMS: PEROXYDISULFURIC ACID, DIAMMONIUM SALT; AMMONIUM PEROXYDISULFATE
PRODUCT CODES: 0762,5481,0770,5670

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	- 1	
FLAMMABILITY	- 0	
REACTIVITY	- 3	(OXIDIZER)
CONTACT	- 2	

ABORATORY PROTECTIVE EQUIPMENT

AFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

DANGER
STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
CAUSES IRRITATION
KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT STORE NEAR COMBUSTIBLE MATERIALS. AVOID CONTACT WITH EYES, SKIN, CLOTHING. KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, SOAK WITH WATER. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL AREA WITH WATER.

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
AMMONIUM PERSULFATE	90-100	7727-54-0

SECTION III - PHYSICAL DATA

BOILING POINT: N/A
VAPOR PRESSURE(MM HG): N/A

MELTING POINT: N/A
VAPOR DENSITY(AIR=1): 7.9

SPECIFIC GRAVITY: 1.98 (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

CONTINUED ON PAGE: 2

SECTION III - PHYSICAL DATA (CONTINUED)

SOLUBILITY(H2O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: WHITE GRANULAR CRYSTALS OR POWDER WITH NO ODOR.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A

FIRE EXTINGUISHING MEDIA
USE WATER SPRAY.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.
STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

TOXIC GASES PRODUCED
AMMONIA, SULFUR DIOXIDE

SECTION V - HEALTH HAZARD DATA

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 820
LD50 (IPR-RAT)(MG/KG) - 226

EFFECTS OF OVEREXPOSURE
INGESTION MAY CAUSE IRRITATION AND BURNING TO MOUTH AND STOMACH.
PROLONGED CONTACT MAY CAUSE SKIN SENSITIZATION.

EMERGENCY AND FIRST AID PROCEDURES
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT

INCOMPATIBLES: STRONG REDUCING AGENTS, ORGANIC MATERIALS, MOST COMMON METALS, COMBUSTIBLE MATERIALS

CONTINUED ON PAGE: 3

SECTION VI - REACTIVITY DATA (CONTINUED)

DECOMPOSITION PRODUCTS: AMMONIA, OXIDES OF SULFUR

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D003 (REACTIVE WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION:	SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, PROPER GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE AND COMBUSTIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	AMMONIUM PERSULFATE
HAZARD CLASS	OXIDIZER
UN/NA	UN1444
LABELS	OXIDIZER

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	AMMONIUM PERSULFATE

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SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

HAZARD CLASS	5.1
UN/NA	UN1444
LABELS	OXIDIZING AGENT

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

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ASKO PRODUCTS (ASKODYNE H) (UNISHEAR 1100) (UNISHEAR 2200)

MATERIAL SAFETY DATA SHEET

ASKO, Inc.

501 West Seventh Avenue
West Homestead, PA 15120
Telephone Number:
(412) 461-4110

CHEMICAL NAME: N/A

TRADE NAME AND SYNONYI

This Material Safety Data Sheet applies to all ASKO products produced under the following tradenames: ASKODYNE "H"™, UNISHEAR 1100™, UNISHEAR 2200™.

CHEMICAL FAMILY: (High Temperature Alloy/Super Alloy) Molecular Weight: N/A

PHYSICAL DATA

Appearance and Odor: Gray Metal/no odor
Boiling Point: N/A
Vapor Pressure (mm Hg): N/A
Vapor Density (Air=1): N/A
Solubility in H_2O: Insoluble
Specific Gravity (H_2O=1): N/A
Percentage Volatile by Volume: N/A
Evaporation rate (=1): N/A
How Best Monitored: Air Sample

HAZARDOUS INGREDIENTS

Material	OSHA PEL (Unit)	ACGIH TLV (Unit)
Iron	5mg/M3	5mg/M3
Cobalt	0.1mg/M3	0.05mg/M3
Chromium	1mg/M3 (metal)	0.5mg/M3 (metal)
Nickel	1mg/M3 (metal)	1mg/M3 (metal)
Molybdenum	15mg/M3	10mg/M3
Aluminum	——	10mg/M3 (metal)
Titanium	——	——
Columbium	——	——

HEALTH HAZARD DATA

Routes of Exposure:

When used for their intended purpose, Asko products manufactured from material referred to in this MSDS will not result in exposure to hazardous ingredients. Exposure to hazardous ingredients may occur if the alloy product is ground with inadequate local exhaust ventilation or subjected to improper grinding operations such as dry grinding both of which generate respirable dust.

Effects of Overexposure:

Acute Effects: Adverse health effects are not expected to occur after acute exposure to metallic dusts. However, relatively short-term exposures (less than 1 year) to metal dusts have been associated with chronic lung disease.

Chronic Effects: Adverse health effects, including nose and throat irritation and transient or permanent respiratory disease, have been observed after exposure to dusts encountered in the grinding and cutting of metal alloys. Since these alloys contain many different metals it has not been possible to say with absolute certainty which metal(s) is the offending agent, though Cobalt is one of the leading candidates. This particular product may also contain significant amounts of nickel and chromium, which have been associated with health effects noted below. Excessive exposure to dust caused by grinding or cutting this product may cause: 1) Dermatitis—especially in individuals sensitive to cobalt, chrome, or nickel; and 2) Lung damage. Pulmonary fibrosis has been seen in workers with excessive exposures to metal dusts. Chromium and nickel compounds have been associated with irritation, ulceration, and cancer in the respiratory system, though it is not known if metallic dusts of these elements can cause such effects.

Health Monitoring: Early recognition of the signs of lung disease from metal dust is important, since this is a progressive disease—but one which may be arrested if caught quickly and exposure is stopped. Further, workers exposed to such dusts are encouraged to not smoke cigarettes, as this habit tends to enhance many types of adverse lung effects.

Emergency and First Aid Procedures: Applicable for dusts or mists.

Inhalation: If symptoms of pulmonary involvement develop (coughing, wheezing, shortness of breath, etc.) remove from exposure and seek medical attention.

Skin Contact: If irritation or rash occurs, thoroughly wash affected area with soap and water and isolate from exposure. If irritation or rash persists, seek medical attention.

Eye Contact: If irritation occurs, flush with copious amounts of water. If irritation persists, seek medical attention.

Ingestion: If substantial quantities are swallowed, dilute with a large amount of water, induce vomiting and seek medical attention.

Carcenogenic Assessment: Nickel and chromium have been identified as known or suspected carcinogens by NTP, IARC or OSHA.

FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A Test Method Used: —— Flammable Limits: N/A

These alloy products are not a fire hazard. Dust generated in grinding operations under rare conditions may present a fire or explosion hazard. However, this is not expected to be a problem under normal handling conditions.

REACTIVITY DATA

Stability: Unstable
Stable X

Conditions to Avoid: N/A

Incompatibility:

Materials to Avoid: Strong acids

Hazardous Decomposition Products: None

Hazardous Polymerization: May Occur
Will Not Occur X

Conditions to Avoid: N/A

SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled:

Clean up using methods which avoid dust generation such as vacuum, wet mop procedures, or wet clean-up. If airborne dust is generated during clean-up, use an appropriate NIOSH approved respirator.

Waste Disposal Method:

Dispose of in accordance with appropriate federal, state, and local regulations. May be sold as scrap for reclamation.

SPECIAL PROTECTION INFORMATION

Respiratory Protection: If dusts generated during grinding and cutting cannot be controlled with local exhaust ventilation, appropriate NIOSH approved respirators should be used to prevent excessive inhalation exposures.

Ventilation: For grinding and cutting operations, local exhaust ventilation should be provided which is adequate to prevent excessive exposures to dust (those which do not exceed relevant OSHA PEL's).

Protective Gloves: Protective Gloves or Barrier cream are recommended when contact with dust or mist is likely. Prior to applying the Barrier cream or use of protective gloves, wash thoroughly.

Eye Protection: Safety glasses with side shields or goggles should be worn when grinding or cutting.

SPECIAL PRECAUTIONS

Dusts from grinding this product are dangerous! Resharpening or grinding should be done using accepted *wet grinding* practices, so that generation of dust is minimized. If dry grinding is unavoidable, precautions must be taken to limit worker exposure: local exhaust ventilation should be provided to keep exposure below the TLV. If ventilation is not sufficient, personal respiratory protection must be provided.

Other Precautions:

Wash thoroughly after handling, before eating or smoking. Wash exposed skin at the end of the work shift. Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or vacuuming (with appropriate filters) the clothing, rags, or other items.

Periodic medical examinations are recommended for individuals regularly exposed to dust or mist.

In case of questions, please call:

ASKO, INC.
(412) 461-4110

Mr. S. A. Jacoby
Vice President

Issue Date: November, 1987
Supersedes: September, 1985

Brick, Fireclay

MATERIAL SAFETY DATA SHEET

J.H. FRANCE REFRACTORIES CO.

SNOW SHOE, PA 16874

TELEPHONE 814-387-6811

Date Prepared:
Nov. 19, 1985

Date Revised:

General Classification of Product: BRICK, FIRECLAY

Trade Name/Synonym of Product:

FR SEMILITE	MEDAL P4
LEHIGH B	ROCKSPAR 105
FRANCE NON SPALL	SL-13
FR	COLUMN 7, 8, 9
FNS	FR 20, IFB
ROCKSPAR	FR 23, IFB
	FR 26, IFB
	FR 28, IFB

Hazardous Ingredients — Section I

Ingredient	CAS Number
Crystalline Silica	7631-86-9

Physical Data — Section II

Appearance & Color
Tan-Geometric Solid

Odor & Solubility
Odorless, -insoluble in water and most acids
-soluble in hydrogen fluoride acid

Fire & Explosion Data — Section III

This material is noncombustible. Use extinguishing media appropriate to the surrounding area

Health Hazard Data — Section IV

Inhalation of all dusts are hazardous. Crystalline silica in the lungs can cause silicosis. This is a chronic slowly developing disease.

Reactivity — Section V

This material is stable under ordinary conditions.

Emergency and First Aid Procedures — Section VI

Terminate exposure. Consult with physician if affected.

Spill, Leak, and Disposal — Section VII

Avoid inhalation of all dusts. Protect eyes. Consult with proper state, local, and federal authorities on waste removal regulations.

Special Protection Information — Section VIII

Wear NIOSH approved safety masks, eye glasses, and gloves. Ventilate where necessary.

Special Precautions and Comments — Section IX

None

Prepared By: I. Dulberg

Title: Technical Manager

7 CARBOFRAX

SOHIO MATERIAL SAFETY DATA SHEET

Sohio Emergency Phone (Toll-Free)
In Ohio: 800-362-8059
Outside Ohio: 800-321-8642
CHEMTREC Assist: 800-424-9300
Other Product Safety Info.: 216-575-8024

MANUFACTURER: Sohio Engineered Materials Company - Refractories Division
ADDRESS: P. O. Box 187, Keasbey, New Jersey 08832

PRODUCT IDENTIFICATION

TRADE NAME: **CARBOFRAX - COMPACTED and CAST**

CAS NUMBER: Mixture
SYNONYM(S): Silicate Bonded Silicon Carbide Refractory
CHEMICAL FAMILY: Carbide
MOLECULAR FORMULA: NA
MOLECULAR WEIGHT: NA
SOHIO PRODUCT CODE: NA HIERARCHY: NA
MSDS NUMBER: AZ6

PRODUCT HAZARD SUMMARY

HEALTH MAY BE IRRITATING TO THE SKIN AND EYES
OVEREXPOSURE TO DUST MAY CAUSE LUNG DAMAGE

NON-COMBUSTIBLE

REACTIVITY STABLE

PRODUCT HEALTH HAZARD INFORMATION

ROUTE OF EXPOSURE EFFECTS OF OVEREXPOSURE

INGESTION:
No exposure under normal conditions of use.

SKIN:
SLIGHTLY TO MODERATELY IRRITATING. Abrasive action may cause cuts and abrasions.

EYE:
SLIGHTLY TO MODERATELY IRRITATING. Abrasive action may cause damage to the outer surface of the eye.

INHALATION:
Dusts may cause respiratory tract irritation. Repeated or prolonged breathing of particles of respirable size may cause severe respiratory disease. Effects may include inflammation of the lung, chest pain, difficult breathing, coughing and possible fibrotic change in the lung--"Pneumoconiosis". Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial hyper-reactivity and chronic bronchial lung disease.

SPECIAL TOXIC EFFECTS:
ND

FIRST AID

INGESTION:
If victim is conscious, give 1-3 glasses of water or milk to dilute stomach contents. Get medical attention if irritation persists.

SKIN CONTACT:
Wash area of contact thoroughly with soap and water. Get medical attention if irritation persists.

EYE CONTACT:
Flush immediately with large amounts of water. Eye lids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if irritation persists.

INHALATION:
Remove affected person from source of exposure. Get medical attention if irritation persists.

NOTES TO PHYSICIAN

ND

PERSONAL PROTECTION INFORMATION

EYE PROTECTION:
Wear safety glasses or chemical goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SKIN PROTECTION:
Wear heavy gloves and safety shoes. Use good personal hygiene. Wear regularly cleaned work clothing. Showering and changing into street clothing after work is desirable.

RESPIRATORY PROTECTION:
Use NIOSH or MSHA approved equipment when airborne exposure limits are exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. Ventilation may be used to control or reduce airborne concentrations.

PHYSICAL PROPERTIES

BOILING POINT, C (F): NA
MELTING POINT, C (F): NA
VAPOR PRESSURE, mm Hg: NA
VAPOR DENSITY (AIR=1): NA
SOLUBILITY IN WATER, %: NA

SPECIFIC GRAVITY: 2.99-3.07
% VOLATILE: NA
EVAPORATION RATE (BUTYL ACETATE=1): NA
VISCOSITY, SUS: NA
POUR POINT: NA
pH: NA

APPEARANCE/ODOR: Odorless dark-grey, dark-red or yellow block.

FIRE AND EXPLOSION DATA

FLASH POINT, C (F): None
IGNITION TEMPERATURE, C (F): NA
FLAMMABILITY LIMITS IN AIR (% BY VOL.): LOWER: NA UPPER: NA

ND = No Data
NA = Not Applicable

BASIC FIREFIGHTING PROCEDURES: This material does not give a flash point by conventional test methods. Use extinguishing agent suitable for type of surrounding fire.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Dusts can form explosive mixtures in air.

REACTIVITY DATA

STABILITY/INCOMPATIBILITY:
Stable under normal conditions of use. Incompatible with chlorine trifluoride and oxididizers..

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS:
NA

ENVIRONMENTAL INFORMATION

SPILL OR RELEASE TO THE ENVIRONMENT:
No special procedures are required for clean-up of spills or leaks of this material. Avoid methods that result in water pollution. Caution should be exercised regarding personnel safety and exposure to the spilled material, as set forth elsewhere in this data sheet.

WASTE DISPOSAL:
This substance, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however it could be hazardous if it is considered toxic, corrosive, ignitable, or reactive according to Federal definitions (40 CFR 261). Additionally, it could be designated as hazardous according to state regulations. This substance could also become a hazardous waste if it is mixed with or comes in contact with a hazardous waste. If such contact or mixing may have occurred, check 40 CFR 261 to determine whether it is a hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262, 263, and 264 apply.

The transportation, storage, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, state, and local regulations.

ADDITIONAL ENVIRONMENTAL REGULATORY INFORMATION:
There may be specific regulations at the local, regional or state level that pertain to this material.

SPECIAL PRECAUTIONS/SUPPLEMENTAL INFORMATION

HANDLING/STORAGE:
ND

TRANSPORTATION REQUIREMENTS

D.O.T. HAZARD CLASS (49 CFR 172.101): NA
D.O.T. PROPER SHIPPING NAME (49 CFR 172.101): NA
D.O.T. LABELS REQUIRED (49 CFR 172.101): NA
D.O.T. PLACARDS REQUIRED: NA
LL OF LADING DESCRIPTION: ND
/NA CODE: NA

INGREDIENT/HEALTH HAZARD INFORMATION

COMPONENT	CAS NO.	%	EXPOSURE LIMITS - REFERENCE
Silicon carbide	409-21-2	80-90	5 mg/M^3 (resp); 15 mg/M^3 (total) PEL, as nuisance dust (OSHA 1978) 5 mg/M^3 (resp); 10 mg/M^3 (total) TLV: 20 mg/M^3 STEL, as nuisance dust (ACGIH 1984-85)
Alumina	1344-28-1	0-5	As nuisance dust (see Silicon carbide)
Silicon dioxide (crystalline)	60676-86-0	5-10	*see below
Calcium oxide	1305-78-8	0-1	5 mg/M^3 PEL (OSHA 1978) 2 mg/M^3 TLV (ACGIH 1984-85)
Iron oxide	1309-37-1	0-1	5 mg/M^3 TLV; 10 mg/M^3 STEL (dust or fume, as Fe) (ACGIH 1984-85)
Remaining components not determined hazardous and/or hazardous components present at less than 1.0% (0.1% for arcinogens).	Mixture	Trace	NA

*OSHA PEL for crystalline silica is calculated as:

$$\text{(respirable dust) PEL} = \frac{10\ \text{mg/M}^3}{\%\text{quartz} + 2(\%\text{cristobalite}) + 2(\%\text{tridymite})}$$

ACGIH TLV for crystalline silica is calculated as:

$$\text{(respirable dust) TLV} = \frac{10\ \text{mg/M}^3}{\%\text{quartz} + 2}$$

$$\text{(total dust) TLV} = \frac{30\ \text{mg/M}^3}{\%\text{quartz} + 3}$$

EFFECTIVE DATE: 10/16/85 COMPLETED BY: G. R. Krautter

REPLACES SHEET DATED: APPROVED BY: RWMast

ND = No Data
NA = Not Applicable

HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: CAUSTIC SODA LIQ 50% DIAPH DATE: 12/17/88 PAGE 01
PRODUCT CODE: 16-08026-03

CAS # 001310-73-2

FORMULA: NaOH

CHEMICAL FAMILY: Alkali

CHEMICAL NAME AND SYNONYMS: Sodium Hydroxide, Lye Solution, Soda Lye, Caustic Soda 50% Rayton Grade.

SUPPLIERS NAME: Harcros Chemicals Inc
5200 Speaker Rd
Kansas City Ks 66106
SUPPLIERS PHONE NUMBER: 913-321-3131
TRANSPROTATION EMERGENCY PHONE NUMBER: 1-800-424-9300

S.A.R.A. INFORMATION

HAZARDS: Fire: Pressure: Reactivity: Acute: Yes Chronic:
PHYSICAL DATA: Mixture:Yes Pure: Solid: Liquid:Yes Gas:

SECTION I Hazardous Ingredients

Ingredient	Percent	TLV
SODIUM HYDROXIDE	50%	PEL/TWA 8Hr 2 mg/m(3) OSHA TLV/TWA 8Hr 2 mg/m(3) Ceiling-ACGIH

*NIOSH recommendation - 2 mg/m(3) 15 min. ceiling.

SECTION II Health Hazards

Threshold Limit Value: As indicated in Section I.

Potential Effects of Exposure:

Eyes: Major Potential Hazard: Caustic soda is destructive to eye tissue on contact. Will cause severe burns that result in damage to the eyes and even blindness. These effects can occur rapidly, affecting all parts of the eye.

Skin: Major Potential Hazard: Caustic soda is destructive to tissues contacted, producing severe burns and temporary loss of hair. Chronic overexposure may consist of multiple areas of superficial destruction of the skin or dermatitis. 4% solution may not cause irritation and burning for several hours, while 25-50% solutions can cause these effects in less than 3 minutes.

Inhalation: Airborne concentrations of dust, mist, or spray of caustic soda may cause mild irritation at 2mg/m(3), and, at higher concentrations, damage to the upper respiratory tract and even to the lung tissue proper which could produce chemical pneumonia, depending upon severity of exposure. Chronic overexposure to spray or mist may result in irritation or tissue damage.

Ingestion: Caustic soda can cause severe burns, pain and complete tissue perforation of mucous membranes of the lips,

CONTINUED ON PAGE 02

SECTION II Health Hazards CONTINUED

mouth, tongue, throat, esophagus, and stomach if swallowed. Severe scarring of the throat can occur after swallowing. Can be fatal.

First aid:

Eyes: Immediately flush eyes with large quantities of water, periodically lifting upper and lower lids to ensure washing of entire surface. Washing eyes within one minute is essential to achieve maximum effectiveness. Seek medical attention immediately. Contact lenses should not be worn when working with this chemical.

Skin: Immediately wash contaminated skin with plenty of water. If skin feels slippery caustic may be present in sufficient quantities to cause rash or burn, continue washing until slippery feeling is gone. If wearing goggles flush head and face thoroughly before removing goggles. Remove contaminated clothing under the shower. This washing may be followed with a rinse of vinegar or dilute acetic acid (3% solution) if available. Remove contaminated clothing and footwear and wash clothing before re-use. Discard footwear which cannot be decontaminated. Seek medical attention immediately.

Inhalation: Get person out of contaminated area to fresh air. If breathing has stopped, artificial respiration should be started. Oxygen may be administered, if readily available. Seek medical attention immediately.

Ingestion: If swallowed, DO NOT induce vomiting. Give large quantities of water. If available, give several glasses of milk. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Seek medical attention immediately.

Other Information:

HEALTH HAZARD DATA:

Acute LC(50):	>0.018 <0.20 mg/l
Oral Acute LD(50)(rat):	140 - 340 mg/kg
Dermal Acute LD(50) (Rabbit):	1350 mg/kg

Sodium Hydroxide is not listed on the IARC, NTP or OSHA carcinogen lists.

Medical Conditions aggravated by Exposure:
May aggravate existing skin and/or eye conditions on contact.

Reproductive Toxicity: NO studies were identified relative to sodium hydroxide and reproductive toxicity.

NOTES TO PHYSICIAN:

CORROSIVE! May cause stricture. If lavage is performed, suggest endotracheal and/or esophagoscopic control.

SECTION III Special Protection Information

Respiratory Protection: For exposures above PEL/TLV and up to 50 mg/m(3) use either any powered air-purifying respirator with dust and mist filter, or any supplied air respirator operating

CONTINUED ON PAGE 03

MATERIAL SAFETY DATA SHEET

SECTION III Special Protection Information CONTINUED

in a continuous flow mode. In either case eye protection must be worn. For this recommendation and for protection at higher rates of exposure, see Ref (1) Sec IX.

Ventilation Required: Provide ventilation adequate to maintain airborne concentrations below OSHA limits of 2 mg/m(3). Local exhaust ventilation preferred where dilutions or reactions cause misting, or solid caustic soda ground up and dust generated. Air concentration of carbon monoxide formed by reaction of caustic soda and reducing sugars should not exceed 50 ppm for an 8 hr TWA. Ventilation equipment should be corrosion-resistant, and, if hydrogen may be generated, explosion-proof.

Protective Clothing:

Eyes: Chemical splash goggles and face shield should be worn whenever exposure possible. Have eye baths immediately available where eye contact can occur.

Skin: Gloves coated with rubber, PVC, or other plastic required, also hard hats, safety shoes, and rubber boots, along with rubber apron when handling caustic soda. Provide a safety shower at any location where skin contact can occur. Sleeves should be worn over gloves and trouser cuffs over rubber boots to avoid skin contact. Caustic soda attacks wool.

Additional Protective Measures: Neutralization supplies, (3% acetic acid preferably) and abundant running water should be close at hand in working and storage areas.

SECTION IV Fire & Explosion Hazard Data

Flash Point (Method): None

Flammable Limits (% Volume in Air):

Upper: Non-Flammable

Lower: Non-Flammable

Extinguishing Media: Use carbon dioxide, "alcohol" foam or dry chemicals where caustic soda is used or stored.

Special Fire Fighting Procedures: Pressure-demand self-contained respiratory protection and protective clothing should be worn by firefighters. Thoroughly decontaminate equipment after use.

Unusual Fire and Explosion Hazards: Highly flammable hydrogen is formed by reaction of concentrated caustic soda with aluminum, tin, zinc, and alloys which contain these metals. See Section IX in regard to violent reaction when water added to concentrated caustic soda.

CONTINUED ON PAGE 04

SECTION V Physical Data

Boiling Point: 289 deg. F

Specific Gravity (H(2)O=1): 1.54 @ 15.6 deg. C

Vapor Pressure (MM HG.): 6.3 @ 104 deg. F.

Vapor Density (AIR=1): N/A

Evaporation Rate (Butyl Acetate=1): N/A

Solubility in Water: Complete

Percent Volatile by Volume: Approx 50

pH: 1% aqueous solution - approx. 13
Freezing Point: 55 deg. F

Appearance and Odor: Liquid, clear or opaque, colorless to slightly colored; no odor.

SECTION VI Reactivity Data

Stability: Stable in normal use, in a sealed container.

Incompatibility: With strong acids, without dilution or agitation, will produce a violent or explosive reaction. Will react with acrolein, hydroquinone, chlorine trifluoride, maleic anhydride, phosphorus pentoxide, tetrahydrofuran, leather and wool, also aluminum, zinc, tin, and alloys containing these metals, nitrocarbons, halocarbons, aldehydes, etc. (Trichlorethylene will react to form spontaneously flammable dichloroacetylene). Will react with some metals forming flammable hydrogen gas.

Hazardous Decomposition Products: Caustic soda reacts with reducing sugars (e.g. in food soils when used in cleaning compounds) to form hazardous carbon monoxide. Before entering closed or semi-closed areas, after cleaning, test and monitor space for carbon monoxide.

Hazardous Polymerization: Will not occur.

SECTION VII Spill and Leak Procedures

Steps to be taken if material is released or spilled: Clean-up workers must use protective clothing and equipment to prevent body contact. Running water should be available for emergency use. Preferred clean-up procedure - dam up spill, cover with sand or inert porous material, transfer into caustic-resistant containers (labelled "Corrosive"). Avoid flushing chemical into public sewer or water systems. Flush clean-up area with water. Dilute acid, preferably acetic acid may be used to neutralize final traces of caustic (observe appropriate safety precautions for handling acid solutions). Small spills may be neutralized with dilute acidic solution (dilute-acetic or 6

CONTINUED ON PAGE 05

SECTION VII Spill and Leak Procedures CONTINUED

molar hydrochloric acid) before flushing away. For large spills pick up spill with vacuum equipment (alkali resistant) for disposal, or flush to holding area with water, prior to neutralization. Notify local health and pollution control officials if flushed spillage unavoidably enters public sewers or other water systems. If spill occurs into navigable water, notify U.S. Coast Guard. Caution! Spill area will be slippery. Spills of 1000 lbs or more must be reported to the National Response Center - Phone: (800)424-8802.

Waste Disposal Method: If not diluted and neutralized, this product can become a hazardous waste as designated by the Environmental Protection Agency under authority of the Resource Conservation and Recovery Act (RCRA). The waste would have RCRA Hazardous Waste number D002 (Corrosive) as designated in 40 CFR 261.22. Federal, state and local regulations should be followed in disposing of this substance.

Aquatic toxicity: 125 ppm/96 hr./mosquito fish/TLm/fresh water.
180 ppm/23 hr./oysters/lethal/salt water.
Ref (2) Sec IX

SECTION VIII D.O.T. Shipping Information

Proper Shipping Name:	SODIUM HYDROXIDE LIQUID OR SOLUTION
Hazard Class:	CORROSIVE MATERIAL
ID Number:	UN1824
Label Requirements:	CORROSIVE
Reportable Quantity:	SHIPMENTS OF 02000 LBS OR MORE ARE REPOR TABLE

Other Information:

SECTION IX Additional Information

This information may be of importance to you:

FURTHER PRECAUTIONARY MEASURES:
Keep container closed. Avoid contact with strong acids to prevent violent or explosive reactions. Do not allow water to get into container because of violent reaction with concentrated caustic soda.

When diluting, add Caustic Soda slowly with agitation to surface of solution to avoid violent splattering, boiling and eruption. Water should always be lukewarm (80-100 deg. F), never start with hot or cold water.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

Minimize skin contact. Wash with soap and water before eating,

CONTINUED ON PAGE 06

MATERIAL SAFETY DATA SHEET

SECTION IX Additional Information CONTINUED

drinking, smoking or using toilet facilities.

References:

(1) NIOSH/OSHA Pocket Guide to Chemical Hazards DHHS(NIOSH) Publication No. 85-114.
(2) U.S. Coast Guard CHRIS Manual; Entry: Sodium Hydroxide.

NPCA/HMIS RATING:

Health-3
Flammability-0
Reactivity-1
Special Protection-H

********* E N D O F R E P O R T *********

NAME: GENE TURNER

DATE ISSUED: 10/25/1987
DATE REVISED: 11/23/1987

< = LESS THAN
> = MORE THAN

N/A = NOT APPLICABLE
N/D = NOT DETERMINED
N/E = NOT ESTABLISHED

UNK = UNKNOWN

The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Harcros Chemicals Inc knows of no medical condition, other than those noted on this material safety data sheet, which aregenerally recognized as being aggravated by exposure to this product.

Cimclean 30

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER 7 COPC-00-0039
APPROVED BY:
ENVIRONMENTAL: ____ DATE: ____
SAFETY: ____ DATE: ____
PURCHASING: ____

IDENTITY *(As Used on Label and List)*: CIMCLEAN 30

... r no ... hat.

Section I

Manufacturer's Name Products Division/ Cincinnati Milacron Marketing Company	**Emergency Telephone Number** 513-841-8181
Address *(Number, Street, City, State, and ZIP Code)* 4701 Marburg Avenue, Cincinnati, Ohio 45209	**Telephone Number for Information** 513-841-8964
	Date Prepared 10/85
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Ethanolamine	3 ppm	3 ppm		
Boric Acid	---	---		
Ethoxylated nonylphenol	---	---		
Pelargonic Acid	---	---		

The ingredients listed above may contribute to the product hazard as listed in Section VI of this sheet.

Section III — Physical/Chemical Characteristics

Boiling Point	212°F	Specific Gravity (H_2O = 1)	1.089
Vapor Pressure (mm Hg.) Not applicable (NA)	NA	Melting Point	NA
Vapor Density (AIR = 1)	NA	Evaporation Rate (Butyl Acetate = 1)	like water

Solubility in Water: 100%

Appearance and Odor: clear; chemical

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
None; self-extinguishing	NA	NA	NA

Extinguishing Media: No fire hazard

Special Fire Fighting Procedures: NA

Unusual Fire and Explosion Hazards: None

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		
	Stable	X	

Incompatability (Materials to Avoid)
Avoid contact of concentrate with strong acids.

Hazardous Decomposition or Byproducts
None.

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? YES Ingestion? NA

Health Hazards (Acute and Chronic) DANGER: Concentrate is highly alkaline. Concentrate is orally toxic. Concentrate is a primary skin irritant. Concentrate is an eye irritant. No adverse chronic effects expected when used as recommended.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure If concentrate is swallowed, may cause abdominal pain, vomiting, severe inflammation of mouth, throat, stomach and mucous membranes. A reversible skin irritation (redness and swelling) may occur from contact with concentrate. Eye damage may occur from contact with concentrate.

Medical Conditions Generally Aggravated by Exposure May aggravate existing skin irritation where further defatting or skin penetration could occur.

Emergency and First Aid Procedures In case of eye contact, flush immediately with running water for 15 minutes, then get prompt medical attention to check for possible irritation. In case of skin contact with concentrate, wash immediately with water. If concentrate or mix is swallowed, do not induce vomiting. Dilute with water or milk. Immediately contact physician and obtain treatment.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Thoroughly flush with water to sewer.

Waste Disposal Method FOR USED MIX: 1) Ultrafiltration for sewer disposal, or 2) recycle equipment for reuse, or 3) treat with polymer or inorganic deemulsifiers, then dispose of top layer by incineration or landfill, and dispose of water layer in sanitary sewer. FOR UNUSED CONCENTRATE: Incinerate, or contact vendor.

Precautions to Be Taken in Handling and Storing
Use only as recommended by Cincinnati Milacron. Avoid all contact of concentrate with eyes or prolonged contact with skin. Do not swallow. If forzen, thaw completely at room temperature.

Other Precautions
Contains amines. Do not add sodium nitrite or other nitrosating agents to this product. Suspected cancer-causing nitrosamines could be formed.

Section VIII — Control Measures

Respiratory Protection (Specify Type)
Product not volatile.

Ventilation			
	Local Exhaust		Special
	Mechanical (General)	General	Other

Protective Gloves: Waterproof gloves required | Eye Protection: Safety shield or goggles require

Other Protective Clothing or Equipment
Effective metalworking plant protective clothing as appropriate.

Work/Hygienic Practices
Good personal hygiene should always be followed.

Cimperial 1011

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0040
APPROVALS:

IDENTITY (As Used on Label and List)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
CIMPERIAL 1011	

Section I

Manufacturer's Name: Products Division/ Cincinnati Milacron Marketing Company	Emergency Telephone Number: 513-841-8181
Address (Number, Street, City, State, and ZIP Code): 4701 Marburg Avenue	Telephone Number for Information: 513-841-8964
Cincinnati, Ohio 45209	Date Prepared: 10/85
	Signature of Preparer (optional):

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
O-phenylphenol	---	---		
Triethanolamine	---	---		
Ethoxylated nonylphenol	---	---		
Mineral oil (mist)	5 mg/M3	5 mg/M3		

The ingredients listed above may contribute to the product hazard as listed in Section VI of this sheet.

Section III — Physical/Chemical Characteristics

ND = not determined

Boiling Point	ND	Specific Gravity (H_2O = 1)	1.006
Vapor Pressure (mm Hg.) Not applicable (NA)	NA	Melting Point	NA
Vapor Density (AIR = 1)	NA	Evaporation Rate (Butyl Acetate = 1)	NA

Solubility in Water: appreciable; emulsifiable

Appearance and Odor: Hazy; evergreen or sassafras

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
370°F (COC)	NA	NA	NA

Extinguishing Media: Foam, carbon dioxide

Special Fire Fighting Procedures: Nil

Unusual Fire and Explosion Hazards: None

C 33 MDS

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0047

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
Manufactured for: 3C Company	314 291-1174
ADDRESS (Number, Street, City, State, and ZIP Code) 382 Fee Fee Rd. Maryland Heights, MO 63043	
CHEMICAL NAME AND SYNONYMS C33MDS	TRADE NAME AND SYNONYMS Solvent Cleaner
CHEMICAL FAMILY Chlorinated Hydrocarbons	FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Chlorinated Hydrocarbons	100	100
8 hour TWA - 100 ppm, acceptable ceiling concentration- 200 ppm, acceptable maximum peak above the acceptable ceiling ~~concentration for an 8 hour shift - 300 ppm concentration,~~ maximum duration = 5 minutes in any 3 hours		

SECTION III - PHYSICAL DATA

BOILING POINT XX) 760 mm. Hg	165-250°F	SPECIFIC GRAVITY (H_2O=1)	1.40
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	100%
VAPOR DENSITY (AIR=1)	4.85	EVAPORATION RATE Butyl Acetate=1	.30
SOLUBILITY IN WATER % by wt. @20° C.	0.05		
APPEARANCE AND ODOR	Colorless appearance, ethereal odor		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
NONE (Tag open or closed)			

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES
Self-contained respiratory protection should be used by firemen fighting fires in buildings in which C33MDS is stored.

UNUSUAL FIRE AND EXPLOSION HAZARDS Vapors can be ignited only by high intensity source of ignition. Combustion forms HCl and possible traces of phosgene.

(Continued on reverse side)

IV. HEALTH HAZARD DATA

HRESHOLD LIMIT VALUE	100 PPM
FFECTS OF OVEREXPOSURE	Alcoholics, persons who are extremely over or underweigh and those with disease of the lungs, liver, kidneys or ~~heart or with high blood pressure or with chronic skin~~ conditions should not be exposed to C33MDS .
MERGENCY AND FIRST ID PROCEDURES	Inhalation - Lower concentrations or exposure for short periods cause light headedness, dizziness and mental dullness, headache and nausea. Extremely high vapor concentration may cause unconsciousness and even death in unventilated areas such as tanks.
FIRST AID	Move to fresh air, use artificial respiration if breathi has stopped. Administer oxygen after breathing has been restored. Never administer adrenalin. Call physician. He should not administer adrenalin. Ingestation - Make person vomit by drinking mustard wate lukewarm salt water or soapy warm water. Repeat three times, then follow with a tablespoon of Epsom Salt. Call physician at once. Skin - Remove all contaminated clothing. Wash all affected areas with warm soap and water. Apply lanolin ointment. In serious cases, call physician.

V. REACTIVITY DATA

STABILITY			
UNSTABLE	STABLE	CONDITIONS TO AVOID	Alkali metals, open flames, welding arcs and explosive mixtures with oxygen under pressure.
X			
INCOMPATIBILITY (materials to avoid)		Do not store in aluminum tanks.	
HAZARDOUS DECOMPOSITION PRODUCTS		HCl and small amounts of phosgene.	
HA[illegible]RDOUS POLYMERIZATION		CONDITIONS TO AVOID	
[illegible], Occur	Will not Occur		
	X		

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED SPILLED	Adequate ventilation must be provided. Workmen should be provided with fresh air masks or sent to fresh air.
WASTE DISPOSAL METHOD	Spills or leaks should be cleaned up immediately. Use forced ventilation or evaporation. If this is not possible, mop up. When wet, mops and rags should be placed in closed containers until they can be dried safely.

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		Fresh air mask or self-contained breathing apparatus.		
VENTILATION	LOCAL EXHAUST	Sufficient to maintain TLV	SPECIAL	
	MECHANICAL (general)		OTHER	
PROTECTIVE GLOVES		Neoprene or Viton	EYE PROTECTION	Chemical safety goggles
OTHER PROTECTIVE EQUIPMENT		Neoprene apron		

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	
OTHER HANDLING AND STORAGE CONDITIONS	~~Do not store in direct sunlight or in excessively hot~~ areas. When opening bungs, open slowly and gradually to relieve pressure. Do not store in pits, depressions or unventilated areas.

3C COMPANY
382 FEE FEE ROAD
MARYLAND HEIGHTS, MO 63043
(314) 291-1174

DATA SHEET FOR 33MDS

PRODUCT DATA AND APPLICATION

33MDS is a cold degreasing solvent used to clean deposits of grease, oil and other soils. 33MDS is completely non-flammable throughout its entire range of evaporation and is non-corrosive to all metals. Because of its strong cleaning action, it is recommended that 33MDS first be tested on any painted surface prior to use.

Evaporation Rate:	1-3 minutes
Flash Point:	None at any level of evaporation (COC)
Explosive Limits:	Lower & Upper - None
Boiling Point:	160° F.
Color:	Clear; Water White

HANDLING PROCEDURES

33MDS contains chlorinated solvents and should be handled as follows:

1) Use with adequate ventilation.
2) Although 33MDS is non-flammable and non-explosive, spills should be cleaned immediately and disposed of properly.
3) Do not use in closed areas without ventilation. 33MDS is toxic by inhalation and repeated or prolonged contact with skin. Wash exposed areas with soap and water.
4) In case of contact with eyes, wash copiously with water for 15 minutes. Get medical attention.
5) Do not take internally. In case of ingestion, make person vomit and call physician immediately.
6) Avoid contact with strong alkalis such as sodium hydroxide.

6/85

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER CCPC-00-[illegible]

240-A

SECTION I NAME AND PRODUCT

MANUFACTURER: BORIDE PRODUCTS, INC.
ADDRESS: 2879 AERO PARK DRIVE
TRAVERSE CITY, MICHIGAN 49684

CONTACT: TIM JOHNSON
PHONE: 616/946-2100
DATE: NOVEMBER 1985
APPROVED BY [signature]

TRADE NAME AND SYNONYMS: VITREOUS BONDED ALUMINA, ABRASIVE PRODUCTS, DRESSING STICKS, MOLD AND DIE POLISHING STONES

CHEMICAL NAME: VITRIFIED ALUMINUM OXIDE

CHEMICAL FAMILY: OXIDE, GLASS

SECTION II COMPOSITION

MATERIAL	CAS #	PERCENT BY WEIGHT	TLV
ALUMINUM OXIDE	1344-28-1	+ 50%	10 mg/m^3
GLASS	NA	+ 5%	10 mg/m^3
MAY CONTAIN ONE OR MORE OF THE FOLLOWING			
SULFUR	7704-34-9	+ 1%	10 mg/m^3
CURED RESIN	NA	+ 1%	10 mg/m^3
SILICATE	NA	+ 1%	10 mg/m^3

SECTION III PHYSICAL AND CHEMICAL DATA

APPEARANCE AND ODOR: RED, PINK, BROWN, GRAY, BLUE OR WHITE SOLID; NO ODOR.
BOILING POINT: NA
VAPOR PRESSURE (mm Hg): NA
VAPOR DENSITY (Air=1): NA
SOLUBILITY IN WATER: NA
SPECIFIC GRAVITY (H_2O=1): Varies
PERCENT VOLATILE BY VOLUME: 0
EVAPORATION RATE (=1): NA
HOW BEST MONITORED: Air Sample

SECTION IV SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Maintain good housekeeping procedures to prevent dust accumulation during grinding. Avoid dust inhalation and direct skin contact with dust.
OTHER PRECAUTIONS: Clean up using methods which avoid dust generation such as vacuum (with appropriate filter to prevent airborne dust levels which exceed the PEL or TLV), wet dust mop or wet clean-up. If airborne dust is generated, use an appropriate NIOSH approved respirator.

Wash hands thoroughly after handling, before eating or smoking. Wash exposed skin at the end of work shift. Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or vacuuming (with appropriate filters) the clothing, rags, or other items.

Periodic medical examinations are recommended for individuals regularly exposed to dust or mist.

SECTION V CORROSIVITY AND REACTIVITY DATA

STABILITY: UNSTABLE STABLE X
INCOMPATIBILITY: CONTACT OF DUST WITH STRONG OXIDIZERS MAY CAUSE FIRE OR EXPLOSIONS
HAZARDOUS DECOMPOSITION PRODUCTS: NONE
CONDITIONS TO AVOID: N/A

CONDITIONS TO AVOID: N/A
MATERIALS TO AVOID: STRONG ACIDS
HAZARDOUS POLYMERIZATION: MAY OCCUR
WILL NOT OCCUR X

SECTION VI HEALTH, FIRST AID AND MEDICAL DATA

GRINDING TOOLS BREAK DOWN DURING USE AND THE RESULTING DUST IS CLASSIFIED BY OSHA AS INERT OR NUISANCE DUST AND WOULD HAVE THE PULMONARY EFFECTS OF INERT DUST. DUST MAY BE INHALED OR COME IN CONTACT WITH SKIN OR EYES.

ROUTES OF EXPOSURE	EFFECTS OF OVEREXPOSURE	EMERGENCY AND FIRST AID PROCEDURES
		(APPLICABLE FOR DUSTS OR MISTS)
INHALATION	DUST FROM GRINDING CAN CAUSE IRRITATION OF NOSE AND THROAT	IF SYMPTOMS OF PULMONARY INVOLVEMENT DEVELOP (COUGHING, WHEEZING, SHORTNESS OF BREATH, ETC(, REMOVE FROM EXPOSURE AND SEEK MEDICAL ATTENTION
SKIN CONTACT	IRRITATION OR RASH MAY OCCUR	WASH AFFECTED AREA WITH SOAP AND WATER AND ISOLATE FROM EXPOSURE. IF RASH PERSISTS, SEEK MEDICAL ATTENTION
EYE CONTACT	IRRITATION MAY OCCUR	FLUSH WITH COPIOUS AMOUNTS OF WATER. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION
INGESTION		IF SUBSTANTIAL QUANTITIES ARE SWALLOWED, DILUTE WITH LARGE AMOUNT OF WATER, INDUCE VOMITING AND SEEK MEDICAL ATTENTION

CARCINOGENIC ASSESSMENT (NTP ANNUAL REPORT, IARC MONOGRAPHS, OTHER): None of the components of this material have been identified as known or suspected carcinogens by NTP, IARC or OSHA.

SECTION I

MANUFACTURER'S NAME: WM. R. HALL CO. PHONE: 609/784-6700
ADDRESS: 901 GIBBSBORO ROAD
LINDENWOOD, NJ 08021
CHEMICAL NAME: RUBBER BONDED ABRASIVE WHEELS & DRESSING STICKS

SECTION II - HAZARDOUS INGREDIENTS

NONE

SECTION III - PHYSICAL DATA

NOT APPLICABLE

SECTION IV - FIRE AND EXPLOSION DATA

NONE

SECTION V - HEALTH HAZARD DATA

WHEEL SWARF IS A NUISANCE DUST. NO TLV ESTABLISHED.

SECTION VI - REACTIVITY DATA

STABLE WITH NO HAZARDOUS POLYMERIZATION OCCURRING.

SECTION VII - SPILL OR LEAK PROCEDURES

NOT APPLICABLE

SECTION VIII - SPECIAL PROTECTION INFORMATION

WHEEL OPERATION SHOULD BE CONDUCTED IN A VENTILATED AREA. TO AVOID INHALATION OF DUST GENERATED BY GRINDING, AN APPROPRIATE DUST MASK SHOULD BE WORN.
EYE PROTECTION - GOGGLES WITH SIDE SHIELDS
OTHER PROTECTIVE EQUIPMENT - IF APPROPRIATE, WHEEL GUARDS, DUST COLLECTORS

SECTION IX - SPECIAL PRECAUTIONS

RECOMMENDATIONS CONCERNING WHEEL SPEEDS, FLANGES, STORAGE AND OTHER FACTORS AFFECTING OPERATIONAL SAFETY SHOULD BE FOLLOWED PURSUANT TO A.N.S.I. B7.1.

MATERIAL SAFETY DATA SHEET : STEEL TROWEL MIX

(073499-0583M -40135925-22112500)	DATE OF ISSUE 06/03/88	SUPERSEDES 06/03/88

-0071

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS
N/A

TRADE NAME & SYNONYMS
STEEL TROWEL MIX

CHEMICAL FAMILY
EPOXY COMPOUND

FORMULA
X<--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
RICHARD STOLLEY/T.S.CHEM.	22112500	214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV*	PEL*	CAS#
PART A: DIGLYCIDIAL ETHER OF BISPHENOL A	IRRITANT	NOT EST.	N/A	1675-54-3
PART B:DIETHYLENETRIAMINE	IRRITANT	1PPM 1.	N/A	111-40-0

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	N/A	SPEC GRAVITY (H2O=1)	A=>1.8=1.5
VAPOR PRESSURE (MM HG).	N/A	COLOR	A:GREY B:BLUE

STEEL TROWEL MIX

(CONTINUED) SECTION III - PHYSICAL DATA PAGE : 02

VAPOR DENSITY (AIR=1)	A=1	ODOR	PUNGENT
PH @ 100%	N/A	CLARITY	OPAQUE
PERCENT, VOLATILE BY VOLUME (%)	0-1.0	EVAPORATION RATE (BU AC = 1)	N/A
SOLUBILITY IN WATER	NEGLIGIBLE		
VISCOSITY	VISCOUS		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
A:>250 FCLOSED CUP		N/A	N/A

EXTINGUISHING MEDIA "ALCOHOL" DRY WATER
X<--FOAM X<--FOAM X<--CO2 X<--CHEMICAL X<--SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
WEAR NIOSH/MSHA APPROVED RESPIRATOR WHEN FIGHTING FIRES IN CONFINED AREAS TO PROTECT FROM ACRID SMOKE, FUMES AND HAZARDOUS DECOMPOSITION PRODUCTS.

UNUSUAL FIRE & EXPLOSION HAZARDS
COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY TO PREVENT POSSIBLE RUPTURE.

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
2 <--HEALTH 1 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

NOT ESTABLISHED FOR MIXTURE SEE SECTION II

EFFECTS OF OVEREXPOSURE - ACUTE - (SHORT TERM EXPOSURE)

PROLONGED OR REPEATED EXPOSURE MAY CAUSE SKIN SENSITIZATION. IN SENSITIVE INDIVIDUALS CONTACT MAY CAUSE SKIN IRRITATION. THIS PRODUCT IS BOTH MECHANICALLY IRRITATING AND CHEMICALLY IRRITATING TO THE EYES. INHALATION IS NOT A HAZARD IN NORMAL USE HOWEVER THIS PRODUCT GIVES OFF TOXIC FUMES WHEN BURNED OR WELDED. INGESTION MAY LEAD TO GASTRIC IRRITATION WITH NAUSEA AND VOMITING.

- CHRONIC - (LONG TERM EXPOSURE)

PERSISTANT SKIN CONTACT CAN CAUSE DEFATTING OF SKIN AND POSSIBLE DERMATITIS
PERSISTANT EYE CONTACT CAN CAUSE REDNESS AND POSSIBLE DAMAGE.
CHRONIC INHALATION CAN CAUSE HEADACHE AND NAUSEA.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION X<-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :
GENERALLY NOT A HAZARD. MOVE TO FRESH AIR AND TREAT SYMPTOMATICALLY.
GIVE OXYGEN IF BREATHING IS DIFFICULT AND ARTIFICIAL RESPIRATION IF
BREATHING HAS STOPPED. GET MEDICAL ATTENTION.

EYE CONTACT:
FLUSH WITH LARGE AOUNTS OF WATER FOR 10 MINUTES. LIFTING UPPER AND LOWER
LIDS OCCASIONALLY. GET MEDICAL ATTENTION IF IRRITATION PERSISTS.TREATMENT
IS MOST EFFECTIVE WITHIN ONE MINUTE.

SKIN CONTACT:
WASH WITH SOAP AND WATER. SENSITIVE INDIVIDUALS SHOULD APPLY AN EMOLLIENT
RICH CREAM AND SHOULD SEE A PHYSICIAN IF IRRITATION PERSISTS.

INGESTION :
DO NOT INDUCE VOMITING. GIVE ONE OR TWO GLASSES OF WATER AND CALL PHYSICIAN
ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL
PNEUMONITIS WHICH CAN BE FATAL.

NOTES TO PHYSICIAN :
GASTRIC LAVAGE IN INDICATED. DO NOT INDUCE VOMITING.

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

DIETHYLENETRIAMINE
ORL-RAT LD50: 1080 MG/KG 2.
SKN-RBT 10 MG/24 H SEV 2.
SKN-RBT LD50: 1090 MG/KG 2.
EPICHLOROHYDRIN OF BIS PHENOL A
IPR-RAT LD50: 2400MG/KG 2.
IPR-MUS LD50: 4000MG/KG 2.

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
STABILITY	N/A		

INCOMPATIBILITY (MATERIALS TO AVOID)
STRONG OXIDIZING AGENTS OR STRONG BASES OR MINERAL ACIDS

HAZARDOUS DECOMPOSITION PRODUCTS
OXIDES OF CARBON, NITROGEN, AMMONIA AND ACRID SMOKE AND FUMES.

	WILL NOT X <--OCCUR	MAY <--OCCUR	CONDITIONS TO AVOID
HAZARDOUS POLYMERIZATION	N/A		

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
SCRAPE UP AND PLACE INTO LABELED CONTAINER. SEPARATE THE TWO COMPONENTS
AS SOON AS POSSIBLE TO PREVENT SET-UP. CLEAN RESIDUE WITH GOOD DETERGENT.

WASTE DISPOSAL METHOD
ALL LOCAL, STATE AND FEDERAL REGULATIONS CONCERNING HEALTH AND
POLLUTION FOR DISPOSAL PROCEDURES SHOULD BE FOLLOWED.

NEUTRALIZING AGENT
N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
LOCAL EXHAUST RECOMMENDED TO CONTROL VAPOR LEVELS IF BURNED OR WELDED.
GENERAL EXHAUST IS MORE THAN ADEQUATE TO PROTECT WORKER FROM EXPOSURE TO
LEVELS ABOVE PERMISSIBLE EXPOSURE LIMITS.

RESPIRATORY PROTECTION
WEAR NIOSH APPROVED RESPIRATOR TO PROVIDE ADEQUATE VENTILATION
WHEN BURNING, WELDING OR MACHINING(GRINDING).

PROTECTIVE GLOVES
RUBBER GLOVES SHOULD BE WORN BY SENSITIVE
INDIVIDUAL DEPENDING ON SEVERITY OF EXPOSURE.

EYE PROTECTION
SAFETY GOGGLES SHOULD BE WORN DEPENDING ON
SEVERITY OF EXPOSURE.

OTHER PROTECTION
CLEAN, PROTECTIVE CLOTHING SHOULD BE WORN.

STORAGE TEMPERATURE 100 F <--MAX 30 F <--MIN	INDOOR X	HEATED	REFRIGERATED X	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

OTHER PRECAUTIONS
WASH THOROUGHLY AFTER HANDLING. KEEP OUT OF REACH OF CHILDREN. AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

SECTION XI - REGULATORY INFORMATION

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
N/A		

THOSE INGREDIENTS LISTED ABOVE ARE SUBJECT TO THE REPORTING REQUIREMENTS OF 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.
IF UE (USE EXEMPTION) APPEARS UNDER UPPER % LIMIT, END USERS ARE EXEMPT FROM NOTIFICATION BECAUSE THE PRODUCT IS USED AND LABELED FOR ROUTINE JANITORIAL WORK, OR THE PRODUCT IS USED AND LABELED FOR FACILITY GROUNDS MAINTENANCE (SUCH AS FERTILIZERS AND HERBICIDES), OR THE PRODUCT IS USED AND LABELED FOR MAINTAINING MOTOR VEHICLES.

SECTION XII - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS	ID NUMBER	REPORT QTY
LABELS	LIMITED QTY	

UNIT CONTAINER

DOT SPS CONTAINER	NET EXPLOSIVE WT.

AEROSOL PROPELLANT(S)

1.THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES, 1986-1987.

MATERIAL SAFETY DATA SHEET : STEEL FI

(040711-0319M -40135925-22100050)

DATE OF ISSUE	
11/11/87	11/12/86

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS
N/A

TRADE NAME & SYNONYMS
STEEL FILLED EPOXY STICK

CHEMICAL FAMILY
EPOXY STICK

FORMULA
X<--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
MARK COHEN/T.S.CHEMIST	22100050	214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV*	PEL*	CAS#
BASE: DIGLYCIDIAL ETHER OF BIS PHENOL A	IRRITANT	5 MG/M3 2.	N/A	25085-99-8
2,4,6 TRI(DIMETHYLAMIND METHYL PHENOL) *	IRRITANT	5PPM 3.	NOT EST.	90-72-2

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	B:>250 F	SPEC GRAVITY (H2O=1)	:>1

STEEL FILLED EPOXY STICK

(CONTINUED) SECTION III - PHYSICAL DATA PAGE : 02

VAPOR PRESSURE (MM HG).	N/A	COLOR	A:LT.GRAY B:DRK GRAY
VAPOR DENSITY (AIR=1)	>1	ODOR	MERCAPTAN LIKE
PH @ 100%	N/A	CLARITY	PUTTY
PERCENT, VOLATILE BY VOLUME (%)	NIL	EVAPORATION RATE (BU AC = 1)	N/A
SOLUBILITY IN WATER	N/A		
VISCOSITY	N/A		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
A:>250 FCLOSED CUP		N/A	N/A

EXTINGUISHING MEDIA "ALCOHOL"
X<--FOAM X<--FOAM X<--CO2 DRY X<--CHEMICAL WATER <--SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
WEAR NIOSH/MSHA APPROVED RESPIRATOR WHEN FIGHTING FIRES IN CONFINED AREAS TO PROTECT FRAOM ACRID SMOKE, FUMES AND HAZARDOUS DECOMPOSITION PRODUCTS.

UNUSUAL FIRE & EXPLOSION HAZARDS
NONE KNOWN

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
2 <--HEALTH 1 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

NOT ESTABLISHED FOR MIXUTRE SEE SECTION II

EFFECTS OF OVEREXPOSURE - ACUTE - (SHORT TERM EXPOSURE)

PROLONGED OR REPEATED EXPOSURE MAY CAUSE SKIN SENSITIZATION. IN SENSITIVE INDIVIDUALS CONTACT MAY CAUSE SKIN IRRITATION. THIS PRODUCT IS BOTH MECHANICALLY IRRITATING AND CHEMICALLY IRRITATING TO THE EYES. INHALATION IS NOT A HAZARD IN NORMAL USE HOWEVER THIS PRODUCT GIVES OFF

TOXIC FUMES WHEN BURNED OR WELDED. INGESTION MAY LEAD TO GASTRIC IRRITATION WITH NAUSEA AND VOMITING.

- CHRONIC - (LONG TERM EXPOSURE)

NO EFFECTS OTHER THAN THOSE NOTED UPON ACUTE EXPOSURE.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION <-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :

GENERALLY NOT A HAZARD. MOVE TO FRESH AIR AND TREAT SYMPTOMATICALLY. GIVE OXYGEN IF BREATHING IS DIFFICULT AND ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED. GET MEDICAL ATTENTION.

EYE CONTACT:

FLUSH WITH LARGE AOUNTS OF WATER FOR 10 MINUTES. LIFTING UPPER AND LOWER LI DS OCCASONALLY. GET MEDICAL IRRITATION IF IRRITATION PERSISTS. TREATMENT IS MOST EFFECTIVE WITHIN ONE MINUTE.

SKIN CONTACT:

WASH WITH SOAP AND WATER. SENSITIVE INDIVIDUALSSHOULDAPPLY AN EMOLLIENT RICH CREAM AND SHOULD SEE A PHYSICIAN IF IRRITATION PERSISTS.

INGESTION :

DO NOT INDUCE VOMITING. GIVE ONE OR TWO GLASSES OF WATER AND CALL PHYSICIAN ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

NOTES TO PHYSICIAN :

GASTRIC LAVAGE IN INDICATED. DO NOT INDUCE VOMITING.

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

2,4,6 TRI(DIMETHYLAMINO METHYL PHENOL)
ORL-RAT LD50: 2.5 G/KG 1.
SKN-RBT LD50: 1.2G/KG 1.
SKN-RAT LD50: 1280 MG/ KG 1.
SKN-RBT 500MG/24H SEVERE 1.
EYE-RBT 500MG/24H/SEVERE 1.

DIGLYCDIAL ETHER OF BISPHENOL A
SKN-RBT 500 MG OPEN MILD 1.
EYE-RBT 2 MG/24 H SEVERE 1.
ORL-RAT LD50: 11 G/KG 1.

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
STABILITY			OPEN FLAMES, LONG-TERM EXPOSURE TO HIGH TEMPERATURES.

INCOMPATIBILITY (MATERIALS TO AVOID)
STRONG OXIDIZING AGENTS OR STRONG BASES OR MINERAL ACIDS

HAZARDOUS DECOMPOSITION PRODUCTS
OXIDES OF CARBON, NITROGEN, AMMONIA AND ACRID SMOKE AND FUMES.

HAZARDOUS	WILL NOT X <--OCCUR	MAY <--OCCUR	CONDITIONS TO AVOID
POLYMERIZATION	N/A		

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
DUE TO THE NATURE OF THE PACKAGING OF THIS PRODUCT A SPILL IS UNLIKELY

WASTE DISPOSAL METHOD
PER ALL LOCAL, STATE AND FEDERAL REGULATINS CONCERNING HEALTH AND POLLUTION FOR DISPOSAL PROCEDURES.

NEUTRALIZING AGENT
N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
LOCAL EXHAUST RECOMMENDED TO CONTROL VAPOR LEVELS IF BURNNED OR WELDED. GENERAL EXHAUST IS MORE THAN ADEQUATE TO PROTECT WORKER FROM EXPOSURE TO LEVELS ABOVE PERMISSIBLE EXPOSURE LIMITS.

RESPIRATORY PROTECTION
WEAR NIOSH APPROVED RESPIRATOR TO PROVIDE ADEQUATE VENTILATION WHEN BURNING, WELDING OR MACHINING(GRINDING).

PROTECTIVE GLOVES
RUBBER GLOVES SHOULD BE WORN BY SENSITIVE INDIVIDUAL DEPENDING ON SEVERITY OF EXPOSURE.

EYE PROTECTION
SAFETY GOGGLES SHOULD BE WORN DEPENDING ON SEVERITY OF EXPOSURE.

OTHER PROTECTION
CLEAN, PROTECTIVE CLOTHING SHOULD BE WORN.

STORAGE TEMPERATURE 100 F <--MAX 30 F <--MIN	INDOOR X	HEATED	REFRIGERATED X	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

OTHER PRECAUTIONS
WASH THOROUGHLY AFTER HANDLING. KEEP OUT OF REACH OF CHILDREN. AVOID CONTACT WITH EYES, SKIN AND CLOTHING..

SECTION XI - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS	ID NUMBER	REPORT QTY

LABELS	LIMITED QTY

UNIT CONTAINER

DOT SPS CONTAINER	NET EXPLOSIVE WT.

AEROSOL PROPELLANT(S)

SECTION XII - REFERENCES

1. DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS, 6TH EDITION, N. IRVING SAX.
2. THRESHOLD LIMIT VALUE FOR CHEMICAL SUBSTANCES IN THE WORK ENVIRONMENT, 2ND EDITION, ACGIH, 1985.
3. VENDOR'S MSDS.

* INGREDIENT PERCENTAGE IS A TRADE SECRET; MASS TRADE SECRET NUMBER 99-127-002

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE IN LIGHT OF CURRENT FORMULATION, HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THIS DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH ASSUMES NO RESPONSIBILITY FOR PERSONAL INJURY OR PROPERTY DAMAGE CAUSED BY THE USE , STORAGE OR DISPOSAL OF THE PRODUCT IN A MANNER NOT RECOMMENDED ON THE PRODUCT LABEL. USERS ASSUME ALL RISKS ASSOCIATED WITH SUCH UNRECOMMENDED USE, STORAGE, OR DISPOSAL OF THE PRODUCT.

Fastbond (R) Contact Adhesive 30NF (Neutral)

MATERIAL SAFETY DATA SHEET

3M
3M CENTER
ST. PAUL, MINNESO
55144-1000
612/733-1110 - Operator 55 Duns No: 00-617-2082

DIVISION: ADHESIVES, COATINGS AND SEALERS
TRADE NAME: FASTBOND(R) Contact Adhesive 30NF (Neutral)
3M I.D. NUMBER: 62-4274-5520-9 62-4274-6530-7 62-4274-7530-6
62-4274-8530-5 62-4274-9530-4 62-4274-9531-2

ISSUED: NOVEMBER 1, 1985
SUPERSEDES: MARCH 1, 1984
DOCUMENT: 1029800

1. INGREDIENTS

INGREDIENTS	C.A.S. NO.	PERCENT	EXPOSURE LIMITS	
polychloroprene elastomer	N/A		N/D	5
synthetic resin	N/A		N/D	5
wetting agents	N/A		N/D	5
protective colloid and antioxidant	N/A		N/D	5
TOTAL OF THE ABOVE	N/A	50.0	N/D	5
toluene	108-88-3	3.0	100 ppm	1
methanol	67-56-1	2.0	200 ppm (ski	1
water	N/A	45.0	N/D	5

SOURCE OF EXPOSURE LIMIT DATA:
1. ACGIH Threshold Limit Values
2. Federal OSHA Permissible Exposure Limit
3. 3M Exposure Guidelines
4. Chemical Manufacturer Recommended Guidelines
5. None Established

ABBREVIATIONS:
N/D - Not Determined
N/A - Not Applicable

2. PHYSICAL DATA

BOILING POINT:	147F (Methanol)
VAPOR PRESSURE:	N/A
VAPOR DENSITY (Air=1):	1.1
EVAPORATION RATE (Ether=1):	>1
APPEARANCE AND ODOR:	Neutral liquid - slight odor of ammonia
SOLUBILITY IN WATER:	Good
SP. GRAVITY (Water=1):	1.1
PERCENT VOLATILE:	Approx. 50
VISCOSITY:	200-600 CPS
pH:	APPROX. 10

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (SETAFLASH): NONE
FLAMMABLE LIMITS - LEL: N/A UEL: N/A

EXTINGUISHING MEDIA:
Water, CO2, foam, dry chemical
SPECIAL FIRE FIGHTING PROCEDURES:
None.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
None.

4. REACTIVITY DATA

STABILITY: STABLE

INCOMPATIBILITY - MATERIALS TO AVOID:
N/A
HAZARDOUS POLYMERIZATION: MAY NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS:
CO, CO2 and smoke particles when subjected to excessive heat or flame.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:
Observe precautions in all sections. Collect spilled material. Place in a metal container.
RECOMMENDED DISPOSAL:
Commercial incineration with destruction and removal efficiency greater than 99.99% is preferred. Otherwise, dispose in a landfill or municipal refuse incinerator as allowed by local and current U.S. Environmental Protection Agency regulations.
ENVIRONMENTAL DATA:
N/D

6. SUGGESTED FIRST AID

EYE CONTACT:
Immediately flush eyes with plenty of water for at least 10 minutes and call a physician.

SKIN CONTACT:
Animal studies indicated that product was not irritating to the skin of the test animals.

INHALATION:
Provide fresh air.

IF SWALLOWED:
Do not induce vomiting; immediately call a physician.

7. PRECAUTIONARY INFORMATION

Avoid eye and skin contact. NOTE: Use personal protective equipment, i.e. chemical goggles or safety glasses and gloves. If product is sprayed, use a particulate type face mask.

8. HEALTH HAZARD DATA

EYE CONTACT: Liquid irritating to eyes upon direct contact. Irritation was limited to the conjunctiva with test animals.

SKIN CONTACT: Animal studies indicated that product was not irritating to the skin of test animals.

INHALATION: None expected.

INGESTION: Practically non-toxic orally. The LD50 (rat) was >5 grams/Kg body weight.

MATERIAL SAFETY DATA SHEET (MSDS)

MANUFACTURER Fibrex Inc., Post Office Box 1148, Aurora, Illinois 60507
(312) 896-4800 (Business Hours) (312) 896-5413 (After Hours)
Date Issued January 31, 1986

SECTION I - PRODUCT IDENTIFICATION

PRODUCT GROUP Industrial Bonded Products

PRODUCT NAMES INCLUDE

Epitherm® 1200	FBX 850 Board
Lapinus® 1200	FBX 650 Board
MF 1200 Pipe Insulation™	FBX 450 Board
FBX 1750 Board	FBX C.G. Felt
FBX 1300 Block	FBX Mineral Fiber Blanket
FBX 1200 Board	FBX Flex Wraps
FBX 1000 Board	FBX Tank Car Insulation
	FBX Packing Fiber

CHEMICAL FAMILY Mixture

Fibrex products may include facing products, such as stainless steel mesh or foil-skrim-kraft. Refer to separate MSDS for such products.

SECTION II - PRODUCT INGREDIENTS

Material	TLV*	CAS#
Vitreous Mineral Fiber	10 mg/m^3	N/A
Cured Resin	10 mg/m^3	N/A

SECTION III - PROPERTIES

COLOR Yellow to tan
SOLUBILITY IN WATER Negligible
ODOR Negligible
PH Not applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT None
FLAMMABLE LIMITS Non-Flammable
EXPLOSION POTENTIAL None

SECTION V - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE

Acute: Fibers and dust from handling product may cause transitory irritation or rash to skin, eyes, or respiratory tract.

Chronic: No chronic effects are known. This MSDS will be updated as new medical findings are published.

TOXICITY Non-toxic
CORROSIVE Non-corrosive
EMERGENCY FIRST AID PROCEDURES

Eyes: Flush with water. Do not rub. If irritation continues, consult a physician.

Skin: Wash particles from skin with soap and water. Do not rub. If irritation persists, consult a physician.

Inhalation: Remove to fresh air

Ingestion: Consult a physician

SECTION VI - REACTIVITY DATA

STABILITY Stable
HAZARDOUS POLYMERIZATION Will not occur
HAZARDOUS DECOMPOSITION Emits normal combustion products (e.g., CO and CO_2) If exposed to fire.
INCOMPATIBILITY Acids, strong alkalis

SECTION VII - SPILLS OR LEAKS

PROCEDURES If fibers or particles are released, use vacuum or wet cleanup procedures to minimize airborne dust. Dispose to solid waste landfill.

SECTION VIII - SPECIAL PROTECTION

GENERAL Work areas should be well ventilated to minimize the possibility of exceeding TLV* levels. Minimize blowing dust. To avoid irritation, use goggles or similar eye-wear, cloth gloves, and loose fitting clothing.

RESPIRATORY PROTECTION Use NIOSH-approved dust respirator if TLV* is exceeded.

PRECAUTIONS Wash after handling. Do not get in eyes or on skin. Do not breathe dust. Launder work clothes separately and clean washer after use.

*TLV refers to the Threshhold Limit Valve, which is the amount an individual can be exposed to in a normal work week (8 hours per day, 5 days per week) without requiring special protection.

FIBERFRAX DURABLANKET

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0078

8

SOHIO CARBORUNDUM

MATERIAL SAFETY DATA SHEET

Sohio Emergency Phone (Toll-Free)
In Ohio: 800-362-8059
Outside Ohio: 800-321-8642
CHEMTREC Assist: 800-424-9300
Other Product Safety Info.: 216-575-8024

MANUFACTURER: Sohio Engineered Materials Company - Fibers Division
ADDRESS: P.O. Box 808, Niagara Falls, New York 14302

PRODUCT IDENTIFICATION

TRADE NAME: **FIBERFRAX® DURABLANKET® 2600**

CAS NUMBER: NA
SYNONYM(S): Ceramic Fiber; Refractory Fiber; MMVF
CHEMICAL FAMILY: Vitreous Aluminosilicate Fibers
MOLECULAR FORMULA: NA
MOLECULAR WEIGHT: NA
SOHIO PRODUCT CODE: NA HIERARCHY: NA
MSDS NUMBER: CT9

PRODUCT HAZARD SUMMARY

HEALTH	WARNING! MAY BE HARMFUL IF INHALED MAY BE IRRITATING TO THE SKIN, EYES AND RESPIRATORY TRACT POSSIBLE CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS
FIRE	NON-COMBUSTIBLE
REACTIVITY	STABLE

PRODUCT HEALTH HAZARD INFORMATION

ROUTE OF EXPOSURE — EFFECTS OF OVEREXPOSURE

INGESTION:
May cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting and diarrhea.

SKIN:
SLIGHTLY TO MODERATELY IRRITATING. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

EYE:
SLIGHTLY TO MODERATELY IRRITATING. Abrasive action may cause damage to the outer surface of the eye.

INHALATION:
May cause respiratory tract irritation. Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial, hyper-reactivity and chronic bronchial or lung disease.

SPECIAL TOXIC EFFECTS:
Currently, there are no known chronic health effects in humans from long-term exposure to ceramic fibers.

In animal studies, refractory ceramic fibers injected into the peritoneal (abdominal) cavity have caused acute abdominal hemorrhage in hamsters but not in rats. Such injections have also produced tumors in life-time rat studies. In fact, similar results have been observed with numerous other fibrous materials. In such experiments, this abnormally sensitive injection technique is a non-physiological method of exposure, bypassing both normal pulmonary protective and clearance mechanisms.

Recently published inhalation studies have provided contradictory results. One study, which used rats as the experimental animal, reported lung damage consisting of alveolar proteinosis and interstitial fibrosis, whereas, another study using a different strain of rat, showed no similar effects.

Similarly, the pulmonary tumor-causing potential of refractory ceramic fibers in animals when inhaled is unclear. Two studies suggest a low-order potential in inducing pulmonary tumors in animals, while two other studies suggest ceramic fibers are not tumorigenic in animals.

Further animal and human health studies are planned. Pending the results of these studies, strict adherence to recommended safe work practices described elsewhere in this data sheet is advised.

FIRST AID

INGESTION:
Do not induce vomiting. Get medical attention if irritation persists.

SKIN CONTACT:
Wash area of contact thoroughly with soap and water. Do not rub or scratch exposed skin. Using a skin cream or lotion after washing may be helpful. Get medical attention if irritation persists.

EYE CONTACT:
Flush immediately with large amounts of water. Eye lids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.

INHALATION:
Remove affected person from source of exposure. Get medical attention.

PERSONAL PROTECTION INFORMATION

The following personal protective guidelines should be followed, especially where engineering controls (e.g. mechanical dust collection and other means of exhaust ventilation) are not technically feasible or do not reduce airborne fiber concentrations to below 2 fibers/cc.

EYE PROTECTION:

Wear safety glasses or chemical goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SKIN PROTECTION:

Wear gloves, hats and full body clothing to prevent skin contact. Use separate lockers for work clothes to prevent fiber transfer to street clothes. Avoid taking unwashed work clothes home or provide disposable work clothing. Wash work clothes separately from other clothing. Rinse washing machine thoroughly after use. If clothing is to be laundered by someone else, inform launderer of proper procedures.

RESPIRATORY PROTECTION:

Use NIOSH or MSHA approved equipment when airborne exposure limits are exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. Ventilation may be used to control or reduce airborne concentrations. Acceptable respirators recommended for airborne ceramic fiber concentrations exceeding 2 fibers/cc are:

Concentration	Respirator Type
2.0 - 5.0 f/cc	3M 8710 or equivalent.
5.0 - 50.0 f/cc	Survivair full face piece with high efficiency filter 1090-00 or equivalent.
> 50.0 f/cc	MSA 01-00-06 full face piece type C supplied-air or equivalent. OSHA approved air source required.

Pending the results of long-term health effects studies, engineering control of airborne fibers to the lowest levels attainable is advised.

PHYSICAL PROPERTIES

BOILING POINT, C (F): NA
MELTING POINT, C (F): ND
VAPOR PRESSURE, mm Hg: NA
VAPOR DENSITY (AIR=1): NA
SOLUBILITY IN WATER, %: NA

SPECIFIC GRAVITY: ND
% VOLATILE: ND
EVAPORATION RATE (BUTYL ACETATE=1): NA
VISCOSITY, SUS: NA
POUR POINT: NA
pH: NA

APPEARANCE/ODOR: ND

FIRE AND EXPLOSION DATA

FLASH POINT, C (F): None
AUTOIGNITION TEMPERATURE, C (F): None
FLAMMABILITY LIMITS IN AIR (% BY VOL.): LOWER: NA UPPER: NA

ND = No Data
NA = Not Applicable

BASIC FIREFIGHTING PROCEDURES: Use extinguishing agent suitable for type of surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NA

REACTIVITY DATA

STABILITY/INCOMPATIBILITY:

Stable under normal conditions of use. Incompatible with hydrofluoric acid and concentrated alkali.

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS:

NA

ENVIRONMENTAL INFORMATION

SPILL OR RELEASE TO THE ENVIRONMENT:

Where possible, use vacuum suction to clean up spilled material. Use dust suppressant where sweeping is necessary. Avoid clean up procedures that may result in water pollution. Personal safety and exposure recommendations described elsewhere in this data sheet apply to exposure during clean up of spilled material.

WASTE DISPOSAL:

This substance, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however it could be hazardous if it is considered toxic, corrosive, ignitable, or reactive according to Federal definitions (40 CFR 261). Additionally, it could be designated as hazardous according to state regulations. This substance could also become a hazardous waste if it is mixed with or comes in contact with a hazardous waste. If such contact or mixing may have occurred, check 40 CFR 261 to determine whether it is a hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262, 263, and 264 apply.

The transportation, storage, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, state, and local regulations.

ADDITIONAL ENVIRONMENTAL REGULATORY INFORMATION:

There may be specific regulations at the local, regional or state level that pertain to this material.

SPECIAL PRECAUTIONS/SUPPLEMENTAL INFORMATION

HANDLING/STORAGE:

Product which has been in service at elevated temperatures (greater than 1600 F) may undergo partial conversion to cristobalite, a form of crystalline silica which can cause severe respiratory disease--"Pneumoconiosis". The amount of cristobalite present will depend on the temperature and length in service.

The permissable exposure limit (PEL) for mineral dusts containing cristobalite is determined by one half the value calculated from the mass formula, $(10\ mg/M^3)/(\%\ SiO_2 + 2)$, i.e. 18% cristobalite; $1/2(10)/(18+2) = 0.25\ mg/M^3$ (OSHA 1978). Particular care should be taken when working with "used" material to minimize generation of dust. When removing and handling ceramic fiber used in high temperature applications, special caution should be taken to avoid unnecessary cutting and tearing of the used material to

minimize generation of airborne dust. Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded, especially in confined areas with inadequate ventilation or other areas. Acceptable respirators recommended for given airborne cristobalite concentrations are:

Concentration	Respirator Type
Up to 10 times PEL	3M 8710 or equivalent.
10 to 100 times PEL	Survivair full face piece with high efficiency filter 1090-00 or equivalent.
> 100 times PEL	MSA 01-00-06 full face piece type C supplied-air or equivalent. OSHA approved air source required.

TRANSPORTATION REQUIREMENTS

D.O.T. HAZARD CLASS (49 CFR 172.101): NA
D.O.T. PROPER SHIPPING NAME (49 CFR 172.101): NA
D.O.T. LABELS REQUIRED (49 CFR 172.101): NA
D.O.T. PLACARDS REQUIRED: NA
BILL OF LADING DESCRIPTION: ND
UN/NA CODE: NA

INGREDIENT/HEALTH HAZARD INFORMATION

COMPONENT	CAS NO.	%	EXPOSURE LIMITS - REFERENCE
minosilicate (vitreous)	NA	99+	2 fibers/cc TWA (SOHIO)*; 10 fibers/cc CL (SOHIO)*
Zirconium dioxide	1314-23-4	0-1	5 mg/M^3 PEL (OSHA 1978) 5 mg/M^3 TLV; 10 mg/M^3 STEL, as Zr (ACGIH 1984-85)
Remaining components not determined hazardous and/or hazardous components present at less than 1.0% (0.1% for carcinogens).	Mixture	Trace	NA

*Pending the results of chronic health effects studies, airborne exposures should be controlled at or below the SOHIO recommended exposure limits listed above.

REVISION DATE: 9/20/85
REPLACES SHEET DATED:
COMPLETED BY: G. R. Krautter
APPROVED BY: RWMast

ND = No Data
NA = Not Applicable

M-60

SOHIO CARBORUNDUM

MATERIAL S.

Sohio Emergency Phone (Toll-Free)
In Ohio: 800-362-8059
Outside Ohio: 800-321-8642
CHEMTREC Assist: 800-424-9300
Other Product Safety Info.: 216-575-8024

MANUFACTURER: Sohio Engineered Materials Company - Fibers Division
ADDRESS: P.O. Box 808, Niagara Falls, New York 14302

PRODUCT IDENTIFICATION

TRADE NAME: **FIBERFRAX® 440 F & J PAPER**

CAS NUMBER: NA
SYNONYM(S): Ceramic Fiber; Refractory Fiber; MMVF
CHEMICAL FAMILY: Vitreous Aluminosilicate Fibers
MOLECULAR FORMULA: NA
MOLECULAR WEIGHT: NA
SOHIO PRODUCT CODE: NA HIERARCHY: NA
MSDS NUMBER: BK5

PRODUCT HAZARD SUMMARY

HEALTH — WARNING!
MAY BE HARMFUL IF INHALED
MAY BE IRRITATING TO THE SKIN, EYES AND RESPIRATORY TRACT
POSSIBLE CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS

FIRE — NON-COMBUSTIBLE

REACTIVITY — STABLE

PRODUCT HEALTH HAZARD INFORMATION

ROUTE OF EXPOSURE — EFFECTS OF OVEREXPOSURE

INGESTION:
May cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting and diarrhea.

SKIN:
SLIGHTLY TO MODERATELY IRRITATING. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

EYE:
SLIGHTLY TO MODERATELY IRRITATING. Abrasive action may cause damage to the outer surface of the eye.

INHALATION:
May cause respiratory tract irritation. Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial, hyper-reactivity and chronic bronchial or lung disease.

SPECIAL TOXIC EFFECTS:
Currently, there are no known chronic health effects in humans from long-term exposure to ceramic fibers.

In animal studies, refractory ceramic fibers injected into the peritoneal (abdominal) cavity have caused acute abdominal hemorrhage in hamsters but not in rats. Such injections have also produced tumors in life-time rat studies. In fact, similar results have been observed with numerous other fibrous materials. In such experiments, this abnormally sensitive injection technique is a non-physiological method of exposure, bypassing both normal pulmonary protective and clearance mechanisms.

Recently published inhalation studies have provided contradictory results. One study, which used rats as the experimental animal, reported lung damage consisting of alveolar proteinosis and interstitial fibrosis, whereas, another study using a different strain of rat, showed no similar effects.

Similarly, the pulmonary tumor-causing potential of refractory ceramic fibers in animals when inhaled is unclear. Two studies suggest a low-order potential in inducing pulmonary tumors in animals, while two other studies suggest ceramic fibers are not tumorigenic in animals.

Further animal and human health studies are planned. Pending the results of these studies, strict adherence to recommended safe work practices described elsewhere in this data sheet is advised.

FIRST AID

INGESTION:
Do not induce vomiting. Get medical attention if irritation persists.

SKIN CONTACT:
Wash area of contact thoroughly with soap and water. Do not rub or scratch exposed skin. Using a skin cream or lotion after washing may be helpful. Get medical attention if irritation persists.

EYE CONTACT:
-Flush immediately with large amounts of water. Eye lids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.

INHALATION:
Remove affected person from source of exposure. Get medical attention.

PERSONAL PROTECTION INFORMATION

The following personal protective guidelines should be followed, especially where engineering controls (e.g. mechanical dust collection and other means of exhaust ventilation) are not technically feasible or do not reduce airborne fiber concentrations to below 2 fibers/cc.

EYE PROTECTION:

Wear safety glasses or chemical goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SKIN PROTECTION:

Wear gloves, hats and full body clothing to prevent skin contact. Use separate lockers for work clothes to prevent fiber transfer to street clothes. Avoid taking unwashed work clothes home or provide disposable work clothing. Wash work clothes separately from other clothing. Rinse washing machine thoroughly after use. If clothing is to be laundered by someone else, inform launderer of proper procedures.

RESPIRATORY PROTECTION:

Use NIOSH or MSHA approved equipment when airborne exposure limits are exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. Ventilation may be used to control or reduce airborne concentrations. Acceptable respirators recommended for airborne ceramic fiber concentrations exceeding 2 fibers/cc are:

Concentration	Respirator Type
2.0 - 5.0 f/cc	3M 8710 or equivalent.
5.0 - 50.0 f/cc	Survivair full face piece with high efficiency filter 1090-00 or equivalent.
> 50.0 f/cc	MSA 01-00-06 full face piece type C supplied-air or equivalent. OSHA approved air source required.

Pending the results of long-term health effects studies, engineering control of airborne fibers to the lowest levels attainable is advised.

PHYSICAL PROPERTIES

BOILING POINT, C (F): NA
MELTING POINT, C (F): ND
VAPOR PRESSURE, mm Hg: NA
VAPOR DENSITY (AIR=1): NA
SOLUBILITY IN WATER, %: NA

SPECIFIC GRAVITY: ND
% VOLATILE: ND
EVAPORATION RATE (BUTYL ACETATE=1): NA
VISCOSITY, SUS: NA
POUR POINT: NA
pH: NA

APPEARANCE/ODOR: ND

FIRE AND EXPLOSION DATA

FLASH POINT, C (F): None
AUTOIGNITION TEMPERATURE, C (F): None

ND = No Data
NA = Not Applicable

FLAMMABILITY LIMITS IN AIR (% BY VOL.): LOWER: NA UPPER: NA
BASIC FIREFIGHTING PROCEDURES: Use extinguishing agent suitable for type of surrounding fire.
UNUSUAL FIRE AND EXPLOSION HAZARDS: NA

REACTIVITY DATA

STABILITY/INCOMPATIBILITY:
Stable under normal conditions of use. Incompatible with hydrofluoric acid and concentrated alkali.

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS:
NA

ENVIRONMENTAL INFORMATION

SPILL OR RELEASE TO THE ENVIRONMENT:
Where possible, use vacuum suction to clean up spilled material. Use dust suppressant where sweeping is necessary. Avoid clean up procedures that may result in water pollution. Personal safety and exposure recommendations described elsewhere in this data sheet apply to exposure during clean up of spilled material.

WASTE DISPOSAL:
This substance, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however it could be hazardous if it is considered toxic, corrosive, ignitable, or reactive according to Federal definitions (40 CFR 261). Additionally, it could be designated as hazardous according to state regulations. This substance could also become a hazardous waste if it is mixed with or comes in contact with a hazardous waste. If such contact or mixing may have occurred, check 40 CFR 261 to determine whether it is a hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262, 263, and 264 apply.

The transportation, storage, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, state, and local regulations.

ADDITIONAL ENVIRONMENTAL REGULATORY INFORMATION:
There may be specific regulations at the local, regional or state level that pertain to this material.

SPECIAL PRECAUTIONS/SUPPLEMENTAL INFORMATION

HANDLING/STORAGE:
Carbon monoxide, carbon dioxide, oxides of nitrogen, reactive hydrocarbons and a small amount of formaldehyde may accompany binder burnoff during first heat. Use adequate ventilation or other precautions to eliminate vapors resulting from binder burnoff. Exposure to burnoff fumes may cause respiratory tract irritation, bronchial hyper-reactivity and asthmatic response..

Product which has been in service at elevated temperatures (greater than 1600 F) may undergo partial conversion to cristobalite, a form of crystalline silica which can cause severe respiratory disease--"Pneumoconiosis". The amount of cristobalite present will depend on the temperature and length in service.

The permissable exposure limit (PEL) for mineral dusts containing cristobalite is determined by one half the value calculated from the mass formula, $(10\ mg/M^3)/(\%\ SiO_2 + 2)$, i.e. 18% cristobalite; $1/2(10)/(18+2) = 0.25\ mg/M^3$ (OSHA 1978). Particular care should be taken when working with "used" material to minimize generation of dust. When removing and handling ceramic fiber used in high temperature applications, special caution should be taken to avoid unnecessary cutting and tearing of the used material to minimize generation of airborne dust. Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded, especially in confined areas with inadequate ventilation or other areas. Acceptable respirators recommended for given airborne cristobalite concentrations are:

Concentration	Respirator Type
Up to 10 times PEL	3M 8710 or equivalent.
10 to 100 times PEL	Survivair full face piece with high efficiency filter 1090-00 or equivalent.
> 100 times PEL	MSA 01-00-06 full face piece type C supplied-air or equivalent. OSHA approved air source required.

TRANSPORTATION REQUIREMENTS

D.O.T. HAZARD CLASS (49 CFR 172.101): NA
D.O.T. PROPER SHIPPING NAME (49 CFR 172.101): NA
D.O.T. LABELS REQUIRED (49 CFR 172.101): NA
D.O.T. PLACARDS REQUIRED: NA
BILL OF LADING DESCRIPTION: ND
UN/NA CODE: NA

INGREDIENT/HEALTH HAZARD INFORMATION

COMPONENT	CAS NO.	%	EXPOSURE LIMITS - REFERENCE
Aluminosilicate (vitreous) containing inorganic binders and fillers	NA	85-95	2 fibers/cc TWA (SOHIO)*; 10 fibers/cc CL (SOHIO)*
Organic binder	NA	5-15	NA

ND = No Data
NA = Not Applicable

COMPONENT	CAS NO.	%	EXPOSURE LIMITS - REFERENCE
Remaining components not determined hazardous and/or hazardous components present at less than 1.0% (0.1% for carcinogens).	Mixture	Trace	NA

*Pending the results of chronic health effects studies, airborne exposures should be controlled at or below the SOHIO recommended exposure limits listed above.

REVISION DATE: 9/20/85
REPLACES SHEET DATED:

COMPLETED BY: G. R. Krautter
APPROVED BY: RWMast

ND = No Data
NA = Not Applicable

FYRQUEL LT

Product Safety Information

FYRQUEL® LT

This Product Safety Information Sheet is principally directed to managerial, safety, hygiene and medical personnel. The description of physical, chemical and toxicological properties and handling advice is based on experimental results and past experience. It is intended as a starting point for the development of health and safety procedures.

This Product Safety Information Sheet meets the material safety data sheet (MSDS) requirements of the federal OSHA Hazard Communication standard (29 CFR 1910.1200).

New Issue 1/86
FYR.354.S

I. PHYSICAL/CHEMICAL PROPERTIES

COMPOSITION:

This product is a blended mixture which contains the following:

Butylated triphenyl phosphate ester, (45%), which contains triphenyl phosphate, CAS Registry Number: 115-86-6

Isodecyl Diphenyl Phosphate, (31%), CAS Registry Number: 29761-21-5

Petroleum Hydrocarbon Mixture, (19%)

PHYSICAL STATE/DESCRIPTION:

Clear amber liquid; slight odor

SPECIFIC GRAVITY:

1.06 at $60^{\circ}/60^{\circ}F$ ($15.5^{\circ}/15.5^{\circ}C$)

VAPOR PRESSURE:

0.1 mmHg at $75^{\circ}F$ ($24^{\circ}C$)

POUR POINT: $-40^{\circ}F$ ($-40^{\circ}C$) max.

FLASH POINT:

$400^{\circ}F$ ($204^{\circ}C$) Cleveland Open Cup

AUTOIGNITION TEMPERATURE:

$920^{\circ}F$ ($493^{\circ}C$)

FIRE POINT: $450^{\circ}F$ ($232^{\circ}C$)

WATER SOLUBILITY: 1 g/100 ml

VISCOSITY:

145-165 SUS at $100^{\circ}F$ ($37.8^{\circ}C$)

IN CASE OF SUSPECTED POISONING, REFER TO THE INFORMATION IN SECTION VII:HUMAN HEALTH AND THE PROCEDURE AND EMERGENCY CONTACTS IN SECTION VIII:FIRST AID.

IN CASE OF SPILLAGE, REFER TO THE PROCEDURE AND EMERGENCY CONTACTS IN SECTION X:SPILL HANDLING OR CALL CHEMTREC 800-424-9300.

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*Registered trademark of Stauffer Chemical Company

Stauffer CHEMICALS
STAUFFER CHEMICAL COMPANY
Specialty Chemical Division
WESTPORT, CONNECTICUT 06881

1344-000-00

II. CHEMICAL REACTIVITY

Does not react with air to any appreciable extent at room temperature. Hydrolyzes slowly with water at elevated temperatures. This process is accelerated by the presence of acids or alkalies. No vigorous reactions or evolution of noxious fumes are expected with common acids, alkalies, oxidizing and reducing agents under ambient conditions.

III. STABILITY

Stable at ambient temperatures and atmospheric pressure. In the absence of moisture, it is stable to much higher temperatures. It is not shock sensitive, will not polymerize and requires no special storage facilities.

IV. FIRE HAZARD

Not defined as a fire hazard. Under fire conditions, may support combustion and decompose to give off toxic materials such as phosphoric oxides. However, the product is self-extinguishing once the source of ignition is removed.

FIREFIGHTING TECHNIQUE

Exposure to triphenyl phosphate, which is present in this product, may cause cholinesterase inhibition (refer to SECTION VIII: FIRST AID).

Products of combustion are irritating to the respiratory tract and may cause breathing difficulty and pulmonary edema. Symptoms may be delayed several hours or longer depending upon the extent of exposure.

As in any fire, prevent human exposure to fire, smoke, fumes or products of combustion. Evacuate nonessential personnel from the fire area. Firefighters should wear full-face, self-contained breathing apparatus and impervious protective clothing.

Use standard firefighting techniques to extinguish fires involving this material -- use water spray, dry chemicals or carbon dioxide.

Keep fire-exposed containers cool with a water spray to prevent rupture due to excessive heat. High pressure water hose may spread product from broken containers increasing contamination or fire hazard.

Contaminated buildings, areas and equipment must not be used until they are properly decontaminated.

VI. TOXICOLOGY

INGESTION

The acute oral LD50 is greater than 5000 mg/kg in both male and female rats. A single oral dose of 5000 mg/kg produced decreased physical activity, piloerection, stained fur, lacrimation, chromodacryorrhea, diarrhea, and no mortality in female rats. A single oral dose of 5000 mg/kg produced decreased physical activity, diarrhea, stained fur and no mortality in male rats.

SKIN CONTACT

The acute dermal LD50 is greater than 2000 mg/kg in rabbits. A single dermal application of 2000 mg/kg did not produce signs of toxicity or mortality in rabbits.

Mild irritant to rabbit skin following a 4-hour exposure period.

EYE CONTACT

Nonirritant to rabbit eyes.

T-11417

VII. HUMAN HEALTH

Principal routes of exposure are skin contact and inhalation. Skin contact with the product may result in mild irritation.

The product contains triphenyl phosphate which has been reported to cause cholinesterase inhibition in humans (ACGIH, 1980). Symptoms of cholinesterase inhibition may include salivation, sweating, headache, nausea, muscle twitching, tremors, incoordination, blurred vision, tears, abdominal cramps, diarrhea, and chest discomfort. Triphenyl phosphate may cause minor symptoms of gastrointestinal distress and symptoms affecting the neuromuscular systems (Proctor and Hughes, 1978).

The product contains a petroleum hydrocarbon solvent mixture. Inhalation of high concentrations of this solvent may cause headache, dizziness, confusion, excitement, drowsiness, or coma.

There are no data available which address medical conditions that are generally recognized as being aggravated by exposure to this product. (Reader should consult SECTION VI: TOXICOLOGY for effects observed in experimental animals under controlled laboratory conditions using this product.)

VIII. FIRST AID

CALL A POISON CENTER OR A PHYSICIAN IMMEDIATELY

If a known exposure occurs or is suspected, immediately start the recommended procedures below and simultaneously contact a Poison Center, a physician or the nearest hospital.

FOR ADDITIONAL MEDICAL OR TOXICOLOGICAL INFORMATION, CALL COLLECT, DAY OR NIGHT, STAUFFER CHEMICAL COMPANY, (203) 226-6602 OR CHEMTREC 800-424-9300

NOTE: Be sure to advise the person contacted that triphenyl phosphate, a component of this product, has been reported to be a cholinesterase inhibitor in humans (ACGIH, 1980). Inform the person contacted of the type and extent of exposure, describe the victim's symptoms, and follow the advice given.

NOTE TO MEDICAL PERSONNEL

Exposure to this product may cause cholinesterase inhibition. If cholinesterase inhibition is suspected, atropine by injection is antidotal. 2-PAM (Protopam Chloride) is also antidotal when administered early and in conjunction with atropine.

INGESTION

If swallowed, immediately give several glasses of water and induce vomiting by gagging the victim with a finger placed on the back of the victim's tongue. Give fluids until vomitus is clear. If victim is unconscious or convulsing, do not induce vomiting or give anything by mouth.

SKIN CONTACT

Flush all affected areas with plenty of water for several minutes. Remove and clean any contaminated clothing and shoes. Seek medical attention if skin irritation occurs.

EYE CONTACT

Flush the eyes with plenty of running water for several minutes. Seek medical attention if eye irritation occurs.

INHALATION

If inhaled, remove to fresh air. Seek medical attention if respiratory irritation occurs or if breathing becomes difficult.

IX. INDUSTRIAL HYGIENE

The recommendations described in this section are provided as general guidance for minimizing exposure when handling this product. Because use conditions will vary depending upon customer applications, specific safe handling procedures should be developed by a person knowledgeable of the intended use conditions and equipment. During the development of safe handling procedures, consideration should be given to the need for cleaning of equipment and piping systems to render them nonhazardous before maintenance and repair activities are performed.

ENGINEERING CONTROLS

In those cases where engineering controls are indicated by the use conditions, the following traditional exposure control techniques may be used to effectively minimize employee exposure: local exhaust ventilation or enclosed system design in combination with appropriate use of personal protective equipment.

INGESTION

All food should be kept in a separate area away from the storage/use location. Eating, drinking and smoking should be prohibited in areas where there is a potential for significant exposure to this material. Before eating, hands and face should be thoroughly washed.

SKIN CONTACT

Skin contact with liquid or its aerosol should be minimized through the use of suitable protective clothing, gloves and footwear selected with regard for use condition exposure potential. Unprotected skin exposed to vapors, aerosol or mist should be thoroughly washed at the end of the work shift.

EYE CONTACT

Eye contact with liquid or its aerosol should be avoided through the use of chemical safety glasses, goggles or a face shield selected with regard for use condition exposure potential.

INHALATION

If use conditions generate airborne aerosol, the material should be handled in an open (e.g., outdoor) or well-ventilated area. Where adequate ventilation is not available, use NIOSH-approved organic vapor respirators with dust, mist and fume filter to reduce exposure. Where exposure potential under the use conditions necessitates a higher level of protection, use a positive-pressure, air-supplied respirator.

EXPOSURE LIMITS

No exposure limits have been established for this product. However, the product contains triphenyl phosphate for which the following exposure limits apply:

The federal OSHA Permissible Exposure Limit (PEL) is 3 mg/m3 as an 8-hour time-weighted average (29 CFR 1910.1000).

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an 8-hour time-weighted average Threshold Limit Value (TLV) which is the same as the above PEL (ACGIH, 1985).

PEL'S and TLV'S refer to airborne concentrations measured in the breathing zone by appropriate sampling techniques.

X. SPILL HANDLING

Make sure all personnel involved in the spill cleanup follow good industrial hygiene practices (refer to SECTION IX: INDUSTRIAL HYGIENE).

Any person entering either a significant spill area or an unknown concentration of an aerosol should use a positive-pressure self-contained breathing apparatus or a positive-pressure air-supplied respirator with escape pack.

Small spills can be handled routinely. Use adequate ventilation and wear a NIOSH-approved organic vapor respirator with dust, mist and fume filter to prevent inhalation exposure. Wear protective clothing to prevent skin and eye contact. Use the following procedures:

Soak up pooled liquid with a suitable absorbent such as clay, sawdust or kitty litter. Sweep up absorbed material and place in a chemical waste container for disposal (refer to SECTION XIII: DISPOSAL OF MATERIAL). Generously cover contaminated area with a slurry of common household powdered laundry detergent and water. Using a stiff brush, work the slurry into cracks and crevices. Allow to stand for 2-3 minutes then flush with water. Repeat if necessary.

Large spills should be diked and pumped to salvage according to a predetermined plan. For assistance in developing a plan, contact the Specialty Chemicals Group, Stauffer Chemical Company, Westport, CT 06881.

IN CASE OF SPILL EMERGENCY, DAY OR NIGHT, CALL CHEMTREC 800-424-9300.

XI. CORROSIVITY TO MATERIALS OF CONSTRUCTION

Noncorrosive to glass or metals. However, because the product has plasticizing properties, it may soften or deteriorate certain plastics and elastomers (particularly vinyl-based resins, neoprene, and natural rubbers).

XII. STORAGE REQUIREMENTS

Containers should be stored in a cool, dry, well-ventilated area away from flammable materials and sources of heat or flame. Store away from foodstuffs or animal feed. Exercise due caution to prevent damage to or leakage from the container.

Prolonged storage at elevated temperatures under wet alkaline conditions should be avoided. Care should be taken to prevent moisture condensation in the container.

Carbon steel is the preferred material of construction for storage containers. The material is commonly shipped in unlined tank cars, tank trucks, and drums.

XIII. DISPOSAL OF MATERIAL

Material that cannot be used or chemically reprocessed should be disposed of at an approved facility in accordance with any applicable regulations under the Resource Conservation and Recovery Act. NOTE: State and local regulations may be more stringent than Federal.

XIV. DISPOSAL OF CONTAINER

Dispose of empty containers according to any applicable regulations under the Resource Conservation and Recovery Act. NOTE: State and local regulations may be more stringent than Federal.

FOR NONEMERGENCY HANDLING INFORMATION, CONTACT THE SPECIALTY CHEMICALS GROUP, STAUFFER CHEMICAL COMPANY, WESTPORT, CT 06881 OR PHONE (203) 222-3000.

REFERENCES CITED

The American Conference of Governmental Industrial Hygienists (ACGIH). (1980). DOCUMENTATION OF THE THRESHOLD LIMIT VALUES FOR SUBSTANCES IN WORKROOM AIR, 4th ed., ACGIH: Cincinnati, OH, pg. 420.

The American Conference of Governmental Industrial Hygienists (ACGIH). (1985). THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES FOR 1985-86. ACGIH: Cincinnati, OH

Proctor, Ph.D, Nick H. and Hughes, M.D., James P. (1978). CHEMICAL HAZARDS OF THE WORKPLACE. J.B. Lippincott Company: Philadelphia, PA

UNION CARBIDE CORPORATION

CARBON PRODUCTS DIVI

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0090

MATERIAL SAFETY

(Essentially Similar to Form OSHA-20)

SECTION I - PRODUCT IDENTIFICATION

Manufacturer's Name UNION CARBIDE CORPORATION, Carbon Products Div.	Emergency Telephone No. 1-800-822-4357 (Day or Night)
Address(Number,Street,City,State,and ZIP Code) Old Ridgebury Road, Danbury, CT 06817	
Product Graphite Shapes	Trade Name and Synonyms UCAR Graphite Shapes-Standard Grades

SECTION II - HAZARDOUS INGREDIENTS

MATERIAL	CAS #	%	TLV
Synthetic Graphite	7782-42-5	100	10 mg/m^3(ACGIH)

SECTION III - PHYSICAL DATA

Boiling Point (^oF)	N/A	Specific Gravity (H_2O=1)	± 2
Vapor Pressure (mm Hg)	N/A	Percent, Volatile by Volume %	N/A
Vapor Density (Air=1)	N/A	Evaporation Rate (=1)	N/A
Solubility in Water	Negligible		

Appearance and Odor Black shapes, no odor.

N/A = Not Applicable

Continued on Reverse Side

Notice from Union Carbide Corporation

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. The opinions expressed herein are those of qualified experts within Union Carbide Corporation. We believe that the informtion contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and these opinions and the conditions of use of the product are not within the control of Union Carbide Corporation, it is the user's obligation to determine the conditions of safe use of the product.

PRODUCT: Graphite Shapes - Standard Grades

SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value:

10 mg/m^3 (nuisance dust TLV)

Primary Route of Entry:

Inhalation if dust is present, N/A otherwise.

Effects of Overexposure:

These items are solid shapes whose normal use does not generate any dust. If dust from product is present, prolonged or repeated breathing of dust may cause pneumoconiosis.

Emergency and First Aid Procedures: - N/A

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	Flammable Limits	
None	% by Volume -	Lel= N/A Uel= N/A

Extinguishing Media

Will not support combustion.

Special Firefighting Procedures

None

Unusual Fire and Explosion Hazards

None

SECTION VI - REACTIVITY DATA

Stability		Conditions to Avoid - N/A
Unstable	Stable	
	X	

Incompatability (Materials to Avoid)

N/A

Hazardous Decomposition Products

CO, CO_2

Hazard Polymerization		Conditions to Avoid - N/A
May Occur	Will Not Occur	
	X	

PRODUCT: Graphite Shapes - Standard Grades

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled

Follow good housekeeping procedures.

Waste Disposal Method

Bury in a landfill where permitted under appropriate federal, state, and local regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify type)

NIOSH-approved respirator for nuisance dust when dust is present.

Ventilation	Local Exhaust Preferred	Special - N/A
	Mechanical (General) Yes	Other N/A

Protective Gloves N/A	Eye Protection Safety glasses

Other Protective Equipment

N/A

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

When machining, prevent dust escape into atmosphere. Do not breathe dust.

Other Precautions

Graphite dust is electrically conductive. Dust accumulations can cause short circuits.

3968D
0985-5

Note:

1. Date of Preparation - 9/1/85
2. Carcinogens are not contained in this product.

MAY 12 1983

Greencast

A. P. GREEN REFRACTORIES COMPANY
Green Boulevard, Mexico, Missouri 65265
Tel. 314-473-3626

Product Name: GREENCAST 94 Product Type: High Alumina Castable

Product Chemical Analysis:

SiO_2	0.05 - 0.15%
Al_2O_3	94.0 - 95.0
Fe_2O_3	0.1 - 0.3
CaO	4.3 - 4.8
MgO	Trace - 0.2
NaKO	0.2 - 0.4

Product Proximate Analysis (Ingredients):

Tabular Alumina	70 to 85%
Refractory Cement	15 to 30

Potential Health Hazard Data:

1. This product's cement may cause drying out and chapping of the skin, and will irritate the eyes if it enters them.

Recommended Disposal Method:

1. Normal housekeeping procedures should be followed in the event of spilled castable.
2. Waste material may be removed to an approved landfill or dump.

Recommended Handling Procedures:

1. Wear standard safety glasses.
2. Avoid breathing of dust while handling dry material.
3. Wear gloves to protect hands from chapping.
4. In case of contact with skin or eyes the contacted area should be washed thoroughly with water.
5. Safety shoes may be worn to protect feet from dropped containers.
6. Avoid breathing of dust during refractory tear-out after service.

This material safety data sheet contains confidential proprietary information and is not to be disclosed to the general public or to competition. The information accumulated herein is believed to be accurate but is not warranted to be, whether originating with A. P. Green Refractories or not. This information is offered solely for use in your evaluation of this product in respect to safety, health and environmental hazards.

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0078

MAY 12 1983

Greencast 97

MATERIAL SAFETY DATA SHEET

A. P. GREEN REFRACTORIES COMPANY
Green Boulevard, Mexico, Missouri 65265
Tel. 314-473-3626

Product Name: GREENCAST 97 | Product Type: High Alumina Castable

Product Chemical Analysis:

SiO_2	0.05 - 0.15%
Al_2O_3	97.0 - 97.5
Fe_2O_3	0.1 - 0.2
CaO	2.0 - 2.5
MgO	Trace - 0.1
NaKO	0.1 - 0.3

Product Proximate Analysis (Ingredients):

Tabular Alumina	75 to 90%
Refractory Cement	10 to 25

Potential Health Hazard Data:

1. This product's cement may cause drying out and chapping of the skin, and will irritate the eyes if it enters them.

Recommended Disposal Method:

1. Normal housekeeping procedures should be followed in the event of spilled castable.

2. Waste material may be removed to an approved landfill or dump.

Recommended Handling Procedures:

1. Wear standard safety glasses.

2. Avoid breathing of dust while handling dry material.

3. Wear gloves to protect hands from chapping.

4. In case of contact with skin or eyes the contacted area should be washed thoroughly with water.

5. Safety shoes may be worn to protect feet from dropped containers.

6. Avoid breathing of dust during refractory tear-out after service.

This material safety data sheet contains confidential proprietary information and is not to be disclosed to the general public or to competition. The information accumulated herein is believed to be accurate but is not warranted to be, whether originating with A. P. Green Refractories or not. This information is offered solely for use in your evaluation of this product in respect to safety, health and environmental hazards.

AT-184-150 A,B,C,D

MATERIAL SAFETY DATA SHEET

MANUFACTURER: Inland Vacuum Industries
35 Howard Ave
Churchville NY 14428

EMERGENCY TELEPHONE
DAYS: 716-293-3330
EVENINGS: 609-275-5629

PREPARED BY: Marc C. Iarelee DATE: 9 May 1988

SECTION ONE: GENERAL INFORMATION

PRODUCT CODE: 052XX
PRODUCT NAME: Inland-13
DESCRIPTION: Solvent refined neutral paraffinic oil
FORMULA: $(CH_2)_n$ $20 \leq n \leq 40$
CAS NUMBER: 64742-54-7

SECTION TWO: REGULATED INGREDIENTS
(29 CFR 1910.1200)

REGULATED MATERIALS AT CONCENTRATION
OF 1 % (WT) OR GREATER

NO HAZARDOUS INGREDIENTS. MATERIAL IS
100 % NEUTRAL PARAFFINIC OIL. MATERIAL
HAS BEEN SUBJECT TO SEVERE SOLVENT REFINING.

SECTION THREE: HEALTH HAZARDS

POSSIBLE ENTRY ROUTES: Ingestion, inhalation of oil mists

TARGET ORGANS:

EFFECTS OF OVEREXPOSURE

ACUTE EFFECTS: Exposure to oil mists may cause nausea and eye irritation. Detailed studies have not been made, but material is not expected to be dermatitic or a sensitizer.
CHRONIC EFFECTS: Unknown

FIRST AID PROCEDURES: Skin - wash with soap and water. Eyes - flush with water and contact a physician. Ingestion - give liquids and induce vomiting if victim is conscious. Contact a physician. Small amounts in mouth may be washed out.
REFERENCES:

SECTION FOUR: FIRE AND EXPLOSION DATA

FLASH POINT: > 213 C METHOD USED: Cleveland Open Cup
EXPLOSIVE LIMITS LOWER: Unknown
UPPER: Unknown
EXTINGUISHING MEDIA: Water fog, chemical foam or carbon dioxide

SPECIAL FIREFIGHTING PROCEDURES: Wear breathing gear when fighting fires in enclosed spaces; incomplete combustion of this material may produce carbon monoxide
UNUSUAL FIRE AND/OR EXPLOSION HAZARDS: None

SECTION FIVE: PHYSICAL PROPERTIES

PHYSICAL STATE: Liquid
VAPOR PRESSURE: < .001 Torr @ 25C BOILING POINT: > 200 C
EVAPORATION RATE (ether = 1): Nil
VAPOR DENSITY: approx 14 WT % VOLATILES: None
SPECIFIC GRAVITY: 0.87 VISCOSITY: 54 cst @ 40 C
SOLUBILITY IN WATER: Nil
APPEARANCE: pale yellow, viscous liquid with faint petroleum odor

SECTION SIX: REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID: Continuous exposure to temperatures > 200 C

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion may produce carbon monoxide

SECTION SEVEN: RELEASE PROCEDURES

PROCEDURE TO BE FOLLOWED IN EVENT OF RELEASE: Small spills may be wiped up with a rag. Large spills should be picked up immediately with an absorbent.

PROCEDURES FOR PROPER WASTE DISPOSAL: Proper waste disposal procedures are dependent on how product was used. Check applicable Federal, State and Local regulations regarding your process effluent.

SECTION EIGHT:SPECIAL PROTECTION

RESPIRATORY PROTECTION: See notes under ventilation below.
PROTECTIVE GLOVES: Yes - made of oil-impermeable rubber
EYE/FACE GLASSES/GOGGLES: Yes - glasses should have side shields
OTHER PROTECTIVE EQUIPMENT: None should be required under normal use

VENTILATION US Gov't 8 hr TWA limit for exposure to oil mists is 5 mg per cubic meter.
LOCAL EXHAUST: As required to meet US Gov't exposure limit.
MECHANICAL EXHAUST: As required to meet US Gov't exposure limit.
OTHER REQUIREMENTS:

SECTION NINE:SPECIAL PRECAUTIONS

SPECIAL HANDLING PRECAUTIONS: None

SPECIAL STORAGE PRECAUTIONS: Store in accordance with procedures for handling NFPA Class III B materials.

ADDITIONAL INFORMATION:

methylene chloride

MATERIAL SAFETY DATA SHEET

The Dow Chemical U.S.A. Midland, MI 48674 Emergency Phone: 517-636-4400

MSD: 000009 Page: 1

PRODUCT NAME: METHYLENE CHLORIDE, TECHNICAL

Effective Date: 10/04/85 Date Printed: 10/07/85 Product Code: 55590

1. INGREDIENTS:

Methylene chloride CAS# 000075-09-2 99.9

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0150

2. PHYSICAL DATA:

BOILING POINT: 104F (39.8C)
VAP PRESS: 340 mmHg @ 20C
VAP DENSITY: 2.93
SOL. IN WATER: 2.0g/100g @ 25C
SP. GRAVITY: 1.320 @ 25/25C
APPEARANCE: Colorless liquid.
ODOR: Not available.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: None
METHOD USED: TOC, TCC, COC

FLAMMABLE LIMITS
LFL: 13% @ 25C
UFL: 23% @ 25C

EXTINGUISHING MEDIA: Water fog.

FIRE & EXPLOSION HAZARDS: Forms flammable vapor-air mixtures at temperatures above ambient. Lower temperatures increase the difficulty of getting it to ignite.

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained respiratory equipment.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Hydrolysis producing small amounts of hydrochloric acid possible with gross water contamination.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Aluminum.

(Continued on Page 2)

4. REACTIVITY DATA: (Continued)

possibly sodium, potassium, and magnesium.

HAZARDOUS DECOMPOSITION PRODUCTS: Open flames and welding arcs can cause thermal degradation with the evolution of hydrogen chloride and very small amounts of phosgene and chlorine.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Small spills: Mop up, wipe up or soak up immediately. Remove to out of doors. Large spills: Evacuate area. Contain liquid; transfer to closed metal containers. Keep out of water supply.

DISPOSAL METHOD: When disposing of the unused contents, the preferred options are to send to licensed reclaimer, permitted incinerators, or to evaporate very small quantities in compliance with local, state, and federal regulations including Subtitle C of the Resource Conservation and Recovery Act. Dumping into sewers, on the ground, or with any body of water is strongly discouraged, and may be illegal. Consult The Dow Chemical Company for further information.

6. HEALTH HAZARD DATA:

EYE: May cause moderate eye irritation and slight corneal injury. Vapors may irritate eyes. In animals, irritation and corneal injury healed primarily within 8 days.

SKIN CONTACT: Prolonged or repeated exposure may cause skin irritation, even a burn. Repeated contact may cause drying or flaking of skin.

SKIN ABSORPTION: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The dermal LD50 has not been determined.

ntinued on Page 3)

6. HEALTH HAZARD DATA: (Continued)

INGESTION: Single dose oral toxicity is low. The oral LD50 for rats is in the range of 1500-2500 mg/kg. If aspirated (liquid enters the lung), may be rapidly absorbed through the lungs and result in injury to other body systems.

INHALATION: Minimal anesthetic or narcotic effects may be seen in the range of 500-1000 ppm methylene chloride. Progressively higher levels over 1000 ppm can cause dizziness, drunkenness; concentrations as low as 10,000 ppm can cause unconsciousness and death. These high levels may also cause cardiac arrythmias (irregular heartbeats).

Excessive exposure may cause irritation to upper respiratory tract and carboxyhemoglobinemia, thereby impairing the blood's ability to transport oxygen.

In confined or poorly ventilated areas, vapors can readily accumulate and can cause unconsciousness and death.

SYSTEMIC & OTHER EFFECTS: Excessive exposure may cause central nervous system, liver or kidney effects. Methylene chloride has been shown to increase the rate of spontaneously occurring malignant tumors in one strain of laboratory mouse and benign tumors in laboratory rats. Other animal studies, as well as several human epidemiology studies, failed to show a tumorigenic response relatable to methylene chloride. Methylene chloride is not believed to pose a measurable carcinogenic risk to man when when handled as recommended. Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother. In animal studies, has been shown not to interfere with reproduction. Negative or equivocal results have been obtained using mammalian cells or animals. This is consistent with the lack of interaction with DNA in rats and hamsters. Although results of Ames bacterial tests have generally been positive, overall the data suggest that genotoxic potential does not appear to be a significant factor in the toxicity of methylene chloride.

(Continued on Page 4)

7. FIRST AID:

EYES: Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

SKIN: Wash off in flowing water or shower. Remove contaminated clothing and wash before reuse.

INGESTION: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

INHALATION: Remove to fresh air. If not breathing, give mouth-to-mouth resuscitation. If breathing is difficult, give oxygen. Call a physician.

NOTE TO PHYSICIAN: Because rapid absorption may occur through lungs if aspirated and cause systemic effects, the decision of whether to induce vomiting or not should be made by a physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. Exposure may increase "myocardial irritability." Do not administer sympathomimetic drugs unless absolutely necessary. If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): ACGIH TLV is 100 ppm. OSHA PEL is 500 ppm; ACC is 1000 ppm; MAC is 2000 ppm.

VENTILATION: Controlling airborne concentrations below the ACGIH TLV exposure guideline is recommended. Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Lethal concentrations may exist in areas with poor ventilation.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is

ontinued on Page 5)

8. HANDLING PRECAUTIONS: (Continued)

required for certain operations, use an approved air-purifying respirator. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved positive pressure self-contained breathing apparatus.

SKIN PROTECTION: For brief contact, no precautions other than clean body-covering clothing should be needed. When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron or full-body suit will depend on operation.

EYE PROTECTION: Use safety glasses. Where contact with liquid is likely, chemical goggles are recommended because eye contact with this material may cause pain, even though it is unlikely to cause injury.

9. ADDITIONAL INFORMATION:

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Exercise reasonable care and caution. Avoid breathing vapors. Store in cool place. Concentrated vapors of this product are heavier than air and will collect in low areas such as pits, degreasers, storage tanks, and other confined areas. Do not enter these areas where vapors of this product are suspected unless special breathing apparatus is used and an observer is present for assistance. Do not pressure product out of vessel or transport container with air.

MSDS STATUS: Revised 1, 3, 5, 6, 7, 8, and 9.

66

Mortar Mix 420

A.P. Green Refractories Co. May 30, 1984

MATERIAL SAFETY DATA SHEET

Green Boulevard, Mexico, Missouri 65265
Tel. 314-473-3626

Product Name: MORTAR MIX 420 Product Type: Wet High Alumina Mortar

Product Chemical Analysis :

SiO_2	1-2.0%
Al_2O_3	88-90
Fe_2O_3	0.05-0.2
CaO	Trace
MgO	Trace
Cr_2O_3	9.0-10.0
$NaKO^3$	0.1-0.3
Plus P_2O_5	5.0-7.0
Plus Water	4.0-8.0

Product Proximate Analysis (Ingredients):

		TLV mg/M^3
Tabular Alumina	70-78%	
Calcined Alumina	20-30	
Clay	2-6	
PLUS:		
Mono Aluminum Phosphate	3-10	
Phosphoric Acid	5-12	1.0
Chromium Oxide	5-20	
Water	4-8	

Potential Health Hazard Data:

1. This product is shipped and used in the moist condition so that no dust is connected with it.

2. This product probably contains a very small amount of quartz contributed by the clay.

3. This product contains 4.5 to 6.0% free phosphoric acid which is distributed within the pores of the refractory aggregate and with the finer ingredients as a coating of the coarser refractory aggregate. This phosphoric acid may cause irritation to the skin and may cause eye damage if it entered them.

4. This product contains less than 20 ppm of hexavalent chromium oxide. Hexavalent chromium is a suspected carcenogenic.

cc E. Moore 11-1-84

5. Phosphorus oxides may be formed during burn in.

Recommended Disposal Method:

1. Normal housekeeping procedures should be followed in the event of product spillage.

2. Waste material may be removed to an approved landfill.

3. Under certain service conditions, mainly due to the presence of alkalis or alkaline earth compounds at high temperatures, soluble hexavalent chromium compounds may be formed. At present, hexavalent chrome is considered a potentially hazardous material, requiring special disposal considerations involving an approved hazardous waste disposal site.

Recommended Handling Procedures:

1. Wear standard safety glasses.

2. Wear gloves to protect hands from skin irritation.

3. In case of contact with skin, the contacted area should be washed with soap and water.

4. In case of entering eyes, the eyes should be immediately washed thoroughly with water and examined by a nurse or physician.

5. Safety shoes may be worn to protect feet from dropped containers.

6. An approved respirator should be worn when working with or around this product after its exposure to elevated temperatures for extended periods of time, in the event that hexavalent chrome is present. (See tearout and repair, below.)

7. During tearout or repair we suggest that the areas to be torn out or repaired be lightly sprayed with water, preferably containing a wetting agent (detergent) to suppress dusting. Protective clothing designed to minimize dust retention should be used and vacuum cleaned prior to removal. Dustless methods of cleaning the working area, such as vacuuming, should be used. Light dust may be swept, using dust suppressing compounds.

NATURE-SOL 100

MATERIAL SAFETY DATA SHEET

1-800-428-7149 DATE PREPARED 1/16/87

BRULIN & COMPANY, INC. P.O. BOX 270-B, INDIANAPOLIS, IN 46206-0270 (317) 923-3211

WEST COAST FACTORY
P.O. Box 698, San Pablo, CA 94806

EAST COAST FACTORY
P.O. Box 389, Westwood, NJ 07675

SOUTHEASTERN FACTORY
104 N. 13th St., Tampa, FL 33602-4297

24 HOUR EMERGENCY NUMBER (317) 923-3233

TRADE NAME NATURE-SOL 100

SECTION 1 — HAZARDOUS INGREDIENTS

CHEMICAL AND COMMON NAME	CAS #	%	TLV (Units)
Dipropylene Glycol, methyl ether	34590-94-8	1-5	100 PPM

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0175

SECTION 2 — PHYSICAL DATA

BOILING POINT	347 °F	FREEZING POINT	NA
SPECIFIC GRAVITY (H_2O = 1)	.867	VAPOR PRESSURE (mm Hg.)	Unknown
VAPOR DENSITY (air = 1)	Unknown	SOLUBILITY IN WATER	Emulsifies
PERCENT VOLATILES BY VOLUME	92	EVAPORATION RATE (____ = 1) n Butyl Acetate	< 1
APPEARANCE, PHYSICAL STATE AND ODOR	Light yellow liquid, citrus odor.		

SECTION 3 — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) 156°F Cleveland Open Cup
120°F Pensky Marten

FLAMMABLE LIMITS — LOWER Unknown — UPPER Unknown

EXTINGUISHING MEDIA CO_2, dry chemical, foam.

SPECIAL FIRE FIGHTING PROCEDURES
Self contained respiratory equipment should be provided for firemen.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Never use welding or cutting torch on or near drum, even empty.

SECTION 4 — REACTIVE DATA

STABILITY		CONDITIONS TO AVOID	
UNSTABLE	STABLE		Heat, sparks, open flames.
	X		
INCOMPATIBILITY (materials to avoid)		Strong oxidizers	
HAZARDOUS DECOMPOSITION PRODUCTS		Carbon monoxide, carbon dioxide	

SECTION 5 — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	See Section 1.
POTENTIAL ROUTES OF ENTRY OR EXPOSURE	Ingestion, Inhalation
HEALTH HAZARDS EFFECTS OF OVEREXPOSURE	ACUTE Skin & eye irritation upon direct contact. Nausea upon ingestion. Excessive inhalation may cause drowsiness.
	CHRONIC None Known
EMERGENCY AND FIRST AID PROCEDURES	INHALATION Remove to fresh air.
	INGESTION DO NOT induce vomiting. Dilute by giving water. Give Milk of Magnesia if available. Keep warm, quiet and call a physician.
	EYES Flush with large amounts of water for 15 min. lifting upper & lower lids occasionally. Get medical attention.
	SKIN Wash with mild soap and water. Remove contaminated clothing and launder before reuse.

SECTION 6 — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)	None		
VENTILATION	Mechanical General		
PROTECTIVE GLOVES	Recommended	EYE PROTECTION	Recommended
OTHER PROTECTIVE EQUIPMENT	None		

SECTION 7 — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Absorb on solid absorbent. Dispose as combustible liquid.
WASTE DISPOSAL METHOD	Dispose according to Federal, State and Local Laws and 40 CFR.

SECTION 8 — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	Store between 40 and 100°F.
OTHER PRECAUTIONS	No special precautions.

- 0213

MATERIAL SAFETY DATA SHEET

HARBISON-WALKER REFRACTORIES
Dresser Industries, Inc.
One Gateway Center, Pittsburgh, Pennsylvania 15222

TELEPHONE: 412-562-6200

DISCLAIMER

11-22-88

This data sheet is based on OSHA FORM 174 but modified to more adeq variation. This information is supplied in good faith by Harbison-Walker ar product may change its characteristics. THE DATA PROVIDED HER SOURCES BELIEVED TO BE GENERALLY RELIABLE. HARBISON-W/ DIRECTLY OR INDIRECTLY ARISING FROM THE USE OF THIS PROD OR LIABILITY FOR RELIANCE OF THE INFORMATION CONTAINED condition of sale. It is solely supplied as an accomodation to the buyer.

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0213
ENVIRONMENTAL
SAFETY
PURCHASING

SECTION I - PRODUCT IDENTIFICATION

Product Tradename:	Type of Refractory:
RUBY PLASTIC	Phosphate Bonded Alumina Chrome Plastic

SECTION II - HAZARDOUS INGREDIENTS

SEE CHECKED BLOCKS INGREDIENT	GEN. CHEM. FORMULA	C.A.S. NUMBER	PERCENTAGE RANGE	OSHA P.E.L.	ACGIH TLV *	NIOSH CRITERIA DOCUMENT NO.
☒ Quartz	SiO_2	14808-607	0 - 1	10 mg/m³ / % Respirable Quartz +2	0.1 mg/m³	75-120
☐ Cristobalite	SiO_2	14464-46-1		½ Quartz Value	0.05 mg/m³	75-120
☐ Tridymite	SiO_2	15468-32-3		½ Quartz Value	0.05 mg/m³	75-120
☐ Fused Silica	SiO_2	60676-86-0		20 mppcf	Use Quartz TLV	75-120
☐ Coal Tar Products	N/A	65996-93-2		0.2mg/m³	0.2 mg/m³	78-107
☐ Petroleum Pitch	N/A	8052-42-4		NONE	0.2 mg/m³	78-106
☒ Phosphoric Acid*	H_3PO_4	7664-38-2	5 - 7	1.0 mg/m³ (mist)	1.0 mg/m³	NONE
☐ Magnesia	MgO	1309-48-4		10 mg/m³	10 mg/m³	NONE
☒ Free Alumina*	Al_2O_3	1344-28-1	74 - 75	10 mg/m³	10 mg/m³	NONE
☐ Lime	CaO	1305-78-8		5.0 mg/m³	2.0 mg/m³	NONE
☒ Chrome III Oxide*	Cr_2O_3	1308-38-9	9 - 10	1.0 mg/m³	0.5mg/m³	NONE
☐						
☐						
☐						

* Subject to reporting under Section 313, Sara Title III

SECTION III - PHYSICAL DATA

Appearance and Odor: Green Color, Acid Odor

Specific Gravity: 3.04 pH: 2-3

Solubility in Water: Slight Phosphoric Acid

Other:

FORM:

____ Brick

____ Granular

X Paste

SECTION IV - FIRE AND EXPLOSION DATA

UNLESS OTHERWISE NOTED, NONE Product is a refractory, and will not burn.

NOTES:

SECTION V - HEALTH HAZARD DATA*

*SEE CHECKED BLOCKS		EXPOSURE REQUIRED	
INGREDIENT	EFFECTS OF OVEREXPOSURE	PROLONGED	SHORT TERM
☒ Free Crystalline Silica	Delayed lung fibrosis - silicosis	√	
☐ Coal Tar Products	Skin, lung mucous membrane carcinogen	√	
	Skin irritation; photosensitization		√
☐ Petroleum Pitch	(Same as Coal Tar Products)		√
☐ Magnesia	Irritant to skin, eyes, mucous membranes, etc.		√
☐ Lime	Irritant to skin, eyes, mucous membranes, etc.		√
☒ Free Alumina	Irritant to skin, eyes, mucous membranes, etc		√
☐ Fused Silica	Delayed lung fibrosis-silicosis	√	
☒ Phosphoric Acid	Primary Irritant - skin, eyes, etc.		√
☒ Chrome III Oxide	Irritant to skin, eyes, mucous membranes, etc.		√
☐			
☐			

EMERGENCY OR FIRST AID PROCEDURES:

☒ Irritants: Wash from skin or flush from eyes using copious amounts of water.

☐ Coal Tar Products: Remove from skin by washing with soap and water. DO NOT use solvents. Same for Petroleum Pitch.

☐ Other:

SECTION VI - REACTIVITY DATA

STABILITY: ☒ STABLE ☐ UNSTABLE

Hazardous decomposition products:

Hazardous Polymerization: ☐ may occur ☒ will not occur

COMMENTS: Incompatability (material to avoid)

Store in cool location prior to use

SECTION VII - SPILL AND LEAK PROCEDURES

Most refractory products may be landfilled. However, since your application of this product may change its chemical characteristics, and since disposal procedures may vary with locale and are subject to change, you should consult the governmental authority having jurisdiction for disposal information.

COMMENTS: After installation and during service, exposure of this product to high temperature and/or certain chemical elements may cause a change to occur to this product and create Chrome VI Compounds. Therefore, during tearout, care should be taken in the removal and handling of this product. Exposure to Chrome VI Compounds may cause cancer; excessive inhalation will increase the risk of serious respiratory damage; avoid contact with the skin, eyes and mucous membranes since Chrome VI Compounds are also corrosive and may cause skin and nasal septum ulcers.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (CHECK ONE): ☒ Approved Dust ☐ Other (Specify):

VENTILATION: Local exhaust ventilation should be provided if routine operation generates dust in excess of allowable limits

PROTECTIVE GLOVES (CHECK TYPE): ☒ Acid Resistant ☐ Impermeable ☐ Abrasion Resistant ☐ Other (Specify):

EYE PROTECTION: Approved safety glasses, goggles or faceshields should be used when handling refractory products.

FOOT PROTECTION (CHECK TYPE): ☐ Metatarsal safety ☐ Impermeable

PROTECTIVE CLOTHING (SPECIFY):

Limit Direct Skin Exposure

SECTION IX - SPECIAL PRECAUTIONS

☐ If block is checked, product contains coal tar pitch, petroleum pitch or creosote. Over-exposure to dust/volatiles may cause cancer and/or irritation to eyes, skin and respiratory tract.
Do not breathe dust/fumes; use with proper ventilation. NIOSH approved respirators and protective clothing should be worn while handling this product.

☐ If block is checked, this resin bonded product contains free formaldehyde and phenol. Exposure to dust and vapor may cause irritation of skin, eyes, nose, and throat. Allergic skin reaction may also occur. Avoid prolonged or repeated contact with eyes or skin; avoid breathing dust or vapor. Wash thoroughly after handling. Wear rubber gloves and approved NIOSH respirator.

☒ If block is checked, the product contains crystalline silica for which there is limited evidence of a possible association with the incidence of cancer in humans.

Prepared By: C. D. Jamison

Emergency Phone: 412-562-6437

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0219

Sec 3 - Prof
Aerosol

MALTER INTERNATIONAL

MATERIAL SAFETY DATA SHEET

Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-OOS-4
Conforming to the requirements of the Occupational Safety and Health Act

CHEMICAL NAME: N/A **Revision Date:** 7/84

Proper Shipping Name: Oil, Lubricating, NOI Aerosol Container **Hazard Class:** None **DOT # :** None

FORMULA: -- proprietary **MOLECULAR WEIGHT:** Unknown

TRADE NAME AND SYNONYMS: S P E Z - P R U F A E R O S O L

II PHYSICAL DATA

BOILING POINT, 760 mm. Hg	115°F	FREEZING POINT	Unknown
SPECIFIC GRAVITY (H_2O = 1)	1.366	VAPOR PRESSURE AT 20°C.	15
VAPOR DENSITY (air = 1)	1.2	SOLUBILITY IN WATER, % by wt.	Appreciable
PER CENT VOLATILES BY VOLUME	83%	EVAPORATION RATE (Ether = 1)	2.1
APPEARANCE AND ODOR	Aluminum colored aerosol liquid, aromatic		

III HAZARDOUS INGREDIENTS

MATERIAL	CAS #	%	TLV (Units)
1,1,1-trichloroethane (Methyl Chloroform)	71-55-6	48-53 %	TLV - 350ppm PEL - 350ppm
Aluminum	7429-90-5	3-8 %	TLV - 10mg/m³ Flammable Solid
Copper	7440-50-8	3-8 %	TLV - 200ug/m³ (Fume) TLV - 1mg/m³
Propellant: 50% Propane, 50% Isobutane	74-98-6 75-28-5	19-24 %	TLV - 1000ppm Flammable Gas

IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	ASTM 180°F	AUTOIGNITION TEMPERATURE	Unknown
FLAMMABLE LIMITS IN AIR, % by volume	Unknown	LOWER	

EXTINGUISHING MEDIA	Water Fog
SPECIAL FIRE FIGHTING PROCEDURES	Use self-contained breathing apparatus with full facepiece operated in pressure-demand or other positive pressure mode.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Product in pressurized aerosols. May explode if overheated.

EMERGENCY PHONE NUMBER

Area Code 504/ 362 3252

MALTER INTERNATIONAL CORP., P.O. Box 6099, NEW ORLEANS, LOUISIANA 70174

V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	350ppm (est)
EFFECTS OF OVEREXPOSURE	INHALATION: Absorption through the lungs may cause systemic effects such as dizziness, drunkeness and unconciousness. SKIN & EYES: May cause irritation. INGESTION: May cause gastrointestinal irritation.
EMERGENCY AND FIRST AID PROCEDURES	EYES: Flush with water for at least 15 minutes, lifting the upper and lower lids. SKIN: Wash thouroughly with soap and water. If irritation of eyes or skin persists, contact a physician. INHALATION: Remove to fresh air. Contact a physician. INGESTION: Contact the Poison Control Center. Do not induce vomiting unless instructed by a medical authority.

VI REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID	
UNSTABLE	STABLE		
	XXXX		None
INCOMPATIBILITY (materials to avoid)		Strong oxidizing materials.	
HAZARDOUS DECOMPOSITION PRODUCTS		None	
HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	
May Occur	Will Not Occur		
	XXXXX		

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Provide ventilation. Allow to evaporate slowly, making sure not to exceed the TLV. Do not allow to enter waterways.
WASTE DISPOSAL METHOD	Do not puncture or incinerate can. Dispose of according to Local, State and Federal Regulations.

VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		If the TLV is exceeded a NIOSH/MSHA approved respirator is required.		
VENTILATION	LOCAL EXHAUST	Provide sufficient mechanical ventilation (local or general) to control fumes below the TLV.	SPECIAL	
	MECHANICAL (general)		OTHER	
PROTECTIVE GLOVES		Recommended	EYE PROTECTION	safety goggles recomd.
OTHER PROTECTIVE EQUIPMENT				

IX SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	Caution: Keep out of reach of children. Danger: Extremely Flammable. Contents under pressure.
OTHER HANDLING AND STORAGE CONDITIONS	Store in a cool place. Store away from heat, open flames, and direct sunlight. Keep below 120°F (49°C).

PETROLITE

MATERIAL S

SPECTRUM SPC2470

Oct 8 1991

PETROLITE CORPORATION
369 MARSHALL AVE.
ST.LOUIS MO 63119 U.S.A

REVISION DATE: 10/02/87
EMERGENCY PHONE: 1-314-961-3500
CHEMTREC EMER NO: 1-800-424-9300

SECTION 1 PRODUCT IDENTIFICATION

PRODUCT: SPC2470 TRADE NAME: SPECTRUM LABEL: 000 097

SHIPPING NAME: NOT HAZARDOUS PER D.O.T. CFR TITLE 49

CHEMICAL DESCRIPTION
5-CHLORO-2-METHYL-4-ISOTHIAZOLIN-3-ONE, 2-METHYL-4-ISOTHIAZOLIN-3-ONE IN WATER.

SECTION 2 HAZARDOUS INGREDIENTS

CAS NUMBER	MATERIAL	%	EXPOSURE LIMITS
26172-55-4	5-chloro-2-methyl-4-isothioazoline-3-one	1.2	Not Established
02682-20-4	2-methyl-4-isothiazolin-3-one	.35	Not Established

SECTION 3 PHYSICAL DATA

SPECIFIC GRAVITY(H20 = 1.0@60 F): 1.026 VOLATILITY: N/A
VAPOR PRESSURE: Not Established SOL. IN WATER: Soluble

MISC. DATA: pH = 3 - 5
APPEARANCE AND ODOR: Pale yellow to green liquid. Mild aromatic odor.

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: >200 F FLAMMABLE LIMITS: Not Established

FLASH METHOD:

EXTINGUISHING MEDIA:
Use water spray or fog, alcohol-type foam, dry chemical or CO2.

FIRE FIGHTING PROCEDURES:
Use a self-contained breathing apparatus with full facepiece operated in pressure-demand or other positive pressure mode. Non-flammable. Keep fire-exposed containers cool using water spray.

CONTINUED ON PAGE: 2

***CONTINUATION OF SPC2470 ***

UNUSUAL FIRE AND EXPLOSION HAZARDS:
None known.

****

SECTION 5 HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE:

INHALATION:

Inhalation of mists, aerosols or very high vapor concentrations will produce intense eye, nose and respiratory irritation and may result in lung damage. Prolonged exposure may result in chemical pneumonitis and, in extreme cases, pulmonary edema.

INHALATION LC50: >13.7 mg/L (Rat)

SKIN AND EYE CONTACT:

Contact with skin will cause moderate to severe irritation or burns. Contact with eyes will result in severe eye irritation or burns, and if not immediately removed, may lead to permanent eye injury.
Repeated skin contact may produce allergic sensitization. In such cases, incidental (minor) contact may cause allergic rashes.

EYE IRR. SCORE: 4 (0=None, 4=Severe)

SKIN IRR SCORE: 3 (0=None, 4=Severe)

DERMAL LD50: >5 g/kg (Rab.)

INGESTION:

Causes severe irritation or burns to the mouth and gastrointestinal tract. In extreme cases may cause kidney and liver damage.

ORAL LD50: 3.81 g/kg (Rat)

EMERGENCY AND FIRST AID PROCEDURES:

If contacted, wash skin immediately with soap and water. Remove contaminated clothing and wash before reuse. If irritation or burns develop, consult a physician. If in eyes, irrigate with flowing water immediately and continuously for fifteen minutes. Consult a physician. If inhaled, remove to fresh air. Administer oxygen if necessary. Consult a physician if symptoms persist or exposure was severe.

CONTINUED ON PAGE: 3

***CONTINUATION OF SPC2470 ***

If ingested, DO NOT induce vomiting. If conscious, drink promptly large quantities of water. Call a physician immediately. NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock and convulsion may be necessary.

****

SECTION 6 REACTIVITY DATA

STABILITY:
Stable under normal conditions of storage and use.

INCOMPATIBILITY:
Keep away from strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS:
Oxides of sulfur and nitrogen. HCl.

HAZARDOUS POLYMERIZATION:
Will not occur.

****

SECTION 7 SPILL AND LEAK PROCEDURES

IF MATERIAL IS SPILLED OR RELEASED:
Dike and absorb spill using hypochlorite solution* in combination with inert material (dry sand, earth etc.) and transfer to suitable containers for disposal.
*Recommended formulation: 8 lbs. calcium hypochlorite (HTH 65% active ingredient), 5 lbs. sodium hydroxide 50% and 77 lbs. water. Sodium hydroxide must be added to maintain alkalinity and prevent the evolution of chlorine gas.

DISPOSAL METHOD:
Place chemical residues and contaminated adsorbent materials into a suitable waste container and take to an approved hazardous waste disposal site. Dispose of all residues in accordance with applicable waste management regulations.

DECONTAMINATION PROCEDURES:
Not appropriate.

****

SECTION 8 SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:
When ventilation is not adequate, use of a NIOSH-approved dust, mist and fume respirator is recommended. In emergency situations, the use of a self-contained breathing unit may be necessary.

CONTINUED ON PAGE: 4

PETROLITE

MATERIAL SAFETY DATA SHEET

***CONTINUATION OF SPC2470 ***

VENTILATION:

General ventilation should be provided to maintain ambient concentrations below nuisance levels. Local ventilation of emission sources may be necessary.

PROTECTIVE CLOTHING:

Synthetic gloves (such as rubber, neoprene, nitrile or viton), chemical goggles, face shield and synthetic apron or coveralls should be used to prevent contact with eyes, skin or clothing.

****

SECTION 9 SPECIAL PRECAUTIONS

Avoid breathing of vapors and contact with eyes, skin or clothing. Hazardous product residue may remain in emptied container. Do not reuse container without commercial cleaning or reconditioning.

****

Spotleak 1003

MATERIAL SAFETY DATA SHEET

"ESSENTIALLY SIMILAR" TO OSHA FORM 20

FORM 4040 (Rev. 8-81)

ADDRESS: Pennwalt Corporation
Three Parkway
Philadelphia, PA 19102

Emergency Phone Number(s)
Business: hours 215/587-7291
Other: hours 713/455-1211

PRODUCT IDENTIFICATION

Pennwalt Product Name: SPOTLEAK 1003 E

Pennwalt Code No.: 1003

Chemical Name and Molecular Formula: Blend:
Tertiary Butyl Mercaptan ($C_4H_{10}S$)
Isopropyl Mercaptan (C_3H_8S)

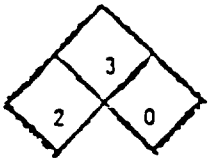
CAS No.(s): See Hazardous Ingredients

Synonyms: None

Chemical Family: alkyl mercaptans

HAZARDOUS INGREDIENTS

MATERIALS OR COMPONENTS	% w/w	HAZARD DATA (TLV, LD50, LC50, etc.)
Tertiary Butyl Mercaptan CAS NO. 75-66-1	76.5	See Toxicity Section
Isopropyl Mercaptan CAS NO. 75-33-2	23.5	



NFPA Code

SHIPPING INFORMATION

Tank Trucks: Mercaptan Mixture, Aliphatic; Flammable Liquid; NA 1228; Flammable Placards; Gas Odorant
Drums: Mercaptan Mixture, Aliphatic; Flammable Liquid; NA 1228; Gas Odorant

PHYSICAL PROPERTIES

Boiling Point/Range	Melting Point	Freezing Point	Molecular Weight (Calculated)
55-70 °C 131-158 °F	N A °C °F	N A °C °F	86.4

Specific Gravity (H_2O=1)	Vapor Pressure	Vapor Density (Air=1)
0.810 @ 15.5 / 15.5 °C	7.3 psia @ 37.8 °C 100 °F	3.0

Solubility in H_2O	% Volatiles by Volume	Evaporation Rate	Other
negligible	100	N A ☐ Ether = 1 ☐ Water = 1 ☐ Butylacetate = 1	N A

Appearance and Odor: water white liquid with gas-like (mercaptan) odor

FIRE AND EXPLOSION DATA

Flash Point	Test Method	Flammable Limits	Autoignition Temperature/Fire Point
°C < 0 °F	TCC	N A Lower % Upper %	N A °C °F

EXTINGUISHING MEDIA *Do not direct water into liquid.
☒ Water-spray * ☒ Water-fog * ☐ Water stream ☒ CO_2 ☒ Dry chemical ☐ Alcohol foam ☒ Foam ☐ Earth or sand

SPECIAL FIRE FIGHTING PROCEDURES: Wear self contained breathing apparatus if entering area where fire is present.
☐ Do not enter building ☐ Allow fire to burn ☐ Water may cause frothing ☐ Do not use water

UNUSUAL FIRE AND EXPLOSION HAZARDS
☐ Dust explosion hazard ☐ Sensitive to shock ☐ Contamination ☐ Temperature ☒ Other (specify): Extremely flammable.

REACTIVITY DATA

STABILITY: ☒ Stable ☐ Unstable

CONDITIONS CONTRIBUTING TO INSTABILITY: NA
☐ Thermal decomposition ☐ Photo degradation ☐ Polymerization ☐ Contamination

INCOMPATIBILITY - Avoid contact with
☐ Strong acids ☐ Strong alkalis ☒ Strong oxidizers ☐ Other (specify):

HAZARDOUS DECOMPOSITION PRODUCTS - THERMAL AND OTHER (list)
Hydrogen sulfide (thermal) Sulfur dioxide (combustion)

CONDITIONS TO AVOID
☒ Heat ☒ Open flames ☒ Sparks ☒ Ignition sources ☐ Other (specify):

SPILL OR LEAK

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
☐ Flush with water ☒ Absorb with sand or inert material ☒ Neutralize * ☐ Sweep or scoop up and remove ☐ Keep upwind. Evacuate enclosed spaces. ☒ Prevent spread of spill
☐ Dispose of immediately ☐ Other (specify):
*Treat unabsorbed liquid with household bleach solution. Do not use solid bleach, as violent reaction and even fire can occur.

WASTE DISPOSAL METHOD - *Consult federal, state, or local authorities for proper disposal procedures.*

Incinerate if permitted by authorities.

CONTINUED ON REVERSE SIDE ➤

Ont 8/1/91

TOXICITY

Oral (acute)

LD_{50}: approx. 5000 mg/kg (rats)

Dermal (acute)

Non-lethal at 2000 mg/kg (rats)

Eye: Moderate conjunctival inflammation (rabbit) reversible

Inhalation (acute)

Non-lethal at 20 mg/l (rats) in 1 hour

Chronic, Subchronic, etc.

N E

HAZARD INFORMATION

Effects of Exposure

PERMISSIBLE EXPOSURE LIMIT (Specify if TLV/TWA or Ceiling (c))

ACGIH 19___ not established | OSHA 19___ not established | Other: N E

IRRITATION

- [ ] Skin
- [X] Eye

Severe: [ ] Skin [ ] Eye

Moderate: [ ] Skin [X] Eye

[ ] Mild (transient)

CORROSIVITY — N A

- [ ] Skin
- [ ] Eye

[ ] 4 hrs. (DOT) [ ] May cause blindness

[ ] 24 hrs. (CPSC)

SENSITIZATION N A

[ ] Skin [ ] Respiratory [ ] Allergen

INHALATION EFFECTS N A

[ ] Narcotic effect [ ] Cyanosis [ ] Asphyxiant

LUNG EFFECTS (Specify): N A

OTHER (Specify):

[ ] Repeated contact - skin defatter

[ ] Other (Specify): Inhaling vapors in high concentration may temporarily desensitize olfactory system and may cause headache and nausea.

Emergency First Aid

INGESTION N A

[ ] Induce vomiting [ ] Do NOT induce vomiting [ ] Give plenty of water [ ] Get medical attention [ ] Other (specify):

DERMAL

[X] Flush with soap and water [ ] Get medical attention [ ] Contaminated clothing - remove & launder [ ] Contaminated shoes - destroy [ ] Other (specify):

EYE CONTACT

[X] Flush with plenty of water for at least 15 minutes [X] Get medical attention [ ] Other (specify):

INHALATION

[X] Remove to fresh air [ ] If not breathing, give artificial respiration [ ] Give oxygen [ ] Get medical attention [ ] Other (specify):

SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS — *Always maintain exposure below permissible exposure limits*

[ ] Consult an industrial hygienist or environmental health specialist [ ] Local exhaust [X] Use with adequate ventilation [ ] Check for air contaminant and oxygen deficiency [ ] Other (specify):

EYE

[ ] Safety glasses [ ] Face shield [X] Goggles

HAND (GLOVE TYPE)

[ ] Polyvinyl chloride [ ] Neoprene [ ] Butyl rubber [ ] Natural rubber [ ] Polyvinyl alcohol [ ] Poly-ethylene [X] Other (specify): Any of these.

RESPIRATOR TYPE - *Use only NIOSH approved equipment*

[X] Self-contained [X] Supplied air [ ] Can or cartridge gas or vapor [ ] Filter - dust, fume, mist [ ] Other (specify):

Use these for entering areas containing spill or fire.

OTHER PROTECTIVE EQUIPMENT — N A

[ ] Rubber boots [ ] Apron [ ] Other (specify):

PRECAUTIONS

PRECAUTIONARY LABELING

[X] Wash thoroughly after handling [X] Do not get in eyes, on skin or clothing [X] Do not breathe vapor [X] Keep container closed [X] Keep away from heat, sparks, and open flames [X] Store in tightly closed containers [ ] Do not store near combustibles [ ] Keep from contact with clothing and other combustible materials [X] Empty container may contain hazardous residues [X] Use explosion proof equipment [ ] Other (specify):

Other handling and storage conditions

N A

Prepared by	Date	Address	Phone
Jeno M. Toth	4/25/84	3 Parkway, Philadelphia, PA 19102	215/587-7291

PLEASE NOTE ➤ "The above information is accurate to the best of our knowledge. However, since data, safety standards, and government regulations are subject change and the conditions of handling and use, or misuse are beyond our control, Pennwalt MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AN DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. User should satisfy himself that he has all current data relevant to his particular u

MATERIAL SAFETY DATA SHEET : LIONS TONGUE OPEN MESH PAGE : 01

(040711-0319M -40135925-88010180)	DATE OF ISSUE	SUPERSEDES
	11/11/87	12/18/86

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS N/A	TRADE NAME & SYNONYMS LIONS TONGUE OPEN MESH
CHEMICAL FAMILY SILICON CARBIDE AND RESIN BINDER	FORMULA <--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH (

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
J. MICHAEL COLE	88010180	214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV*	PEL*	CAS#
SILICON CARBIDE		10MG/M3	15MG/M3	409-21-2

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	N/A	SPEC GRAVITY (H2O=1)	N/A
VAPOR PRESSURE (MM HG).	N/A	COLOR	CLOTH COATED
VAPOR DENSITY (AIR=1)	N/A	ODOR	N/A
PH @ 100%	N/A	CLARITY	N/A

(CONTINUED) SECTION III - PHYSICAL DATA

PERCENT VOLATILE BY VOLUME (%)	N/A	EVAPORATION RATE (BU AC = 1)	N/A
SOLUBILITY IN WATER	N/A		
VISCOSITY	N/A		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
N/A N/A	N/A	N/A	N/A

EXTINGUISHING MEDIA <--FOAM "ALCOHOL" <--FOAM <--CO2 DRY <--CHEMICAL WATER <--SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
BACKINGS AND RESIN BINDER WILL BURN OR DECOMPOSE, USE RESPIRATORY PROTECTION.

UNUSUAL FIRE & EXPLOSION HAZARDS
N/A

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
<--HEALTH <--FLAMMABILITY <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

N/A

EFFECTS OF OVEREXPOSURE

- ACUTE - (SHORT TERM EXPOSURE)

MAY CAUSE COUGHING, SHORTNESS OF BREATH.

- CHRONIC - (LONG TERM EXPOSURE)

MAY AFFECT BREATHING CAPACITY.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION <-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES
INHALATION :
MAY CAUSE COUGHING, SHORTNESS OF BREATH. MAY AFFECT BREATHING CAPACITY. REMOVE TO FRESH AIR APPLY ARTIFICAL RESPIRATION AS NEEDED. OBTAIN FIRST AID OR MEDICAL ASSISTANCE.

EYE CONTACT:
DUST MAY IRRITATE EYES. WASH WITH LARGE AMOUNTS OF WATER. OBTAIN FIRST AID OR MEDICAL ASSISTANCE, IF NEEDED.

SKIN CONTACT:
NOT ABSORBED THROUGH SKIN; MAY CAUSE ABRASIONS. OBTAIN FIRST AID OR MEDICAL ASSISTANCE, IF NEEDED.

INGESTION :
NO KNOWN ADVERSE EFFECTS, BUT INGESTION NOT RECOMMENDED.

NOTES TO PHYSICIAN :
REMOVE TO FRESH AIR AND SUPPLY ARTIFICAL RESPIRATION AS NEEDED. OBTAIN FIRST AID OR MEDICAL ASSISTANCE.

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

N/A

SECTION VII - REACTIVITY DATA

STABILITY	X<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
	N/A		

INCOMPATIBILITY (MATERIALS TO AVOID)
N/A

HAZARDOUS DECOMPOSITION PRODUCTS
IN USE DUST AND DECOMPOSING RESIN SYSTEM FUMES ARE GENERATED.

HAZARDOUS POLYMERIZATION	WILL NOT	MAY	CONDITIONS TO AVOID
	X <--OCCUR	<--OCCUR	

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
NORMAL CLEAN UP PROCEDURES.

WASTE DISPOSAL METHOD
STANDARD LANDFILL METHODS CONSISTANT WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS.

NEUTRALIZING AGENT
N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
RECOMMENDED.

RESPIRATORY PROTECTION
AS NEEDED, APPROVED DUST RESPIRATOR OSHA 24CFR1910-134

PROTECTIVE GLOVES
AS DESIRED BY USER

EYE PROTECTION
RECOMMENDED

OTHER PROTECTION
AS NEEDED, POSSIBLY HEARING EQUIPMENT.

SECTION X - STORAGE AND HANDLING INFORMATION

STORAGE TEMPERATURE 000000<--MAX 000000<--MIN	INDOOR	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
HANDLE WITH ADEQUATE VENTILATION. A FORMALDEHYDE OR PHENOLIC RESIN ODOR FROM THE BINDING SYSTEM MAY ON OCCASION BE RELEASED DURING STORAGE.

OTHER PRECAUTIONS
N/A

SECTION XI - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS | ID NUMBER | REPORT QTY

LABELS | LIMITED QTY

UNIT CONTAINER

DOT SPS CONTAINER | NET EXPLOSIVE WT.

AEROSOL PROPELLANT(S)

SECTION XII - REFERENCES

G. S. ROBINS & CO.
CHEMICALS WITH SERVICE
126 Chouteau St. Louis, Mo. 63102
(314) 621-5155

ULTRA SONIC CLEANER #2

MATERIAL SAFETY DATA SHEET

Product Name

ULTRA SONIC CLEANER #2

PRODUCT IDENTIFICATION

Synonyms: None

DOT Proper Shipping Name: N/A

DOT Hazard Class/ I.D. No.: N/A

Label Requirements: N/A

U.S. Surface Freight Classification: N/A

HAZARDOUS INGREDIENTS

COMPONENT	%	HAZARD DATA
Water	Balance	
Disodium Salt	2-3%	
Surfactant	3-4%	
Sodium Hydroxide	Under 1%	$2M/M^3$
Trisodium NTA	Under 3.5%	

WARNING STATEMENTS

Wash thoroughly after handling. Keep from freezing. Keep out of reach of children.

PRECAUTIONARY MEASURES

Use good personal hygiene practices. Where gross eye/skin contact may be a problem, wear or use appropriate protective equipment. Do not let material remain in contact with skin.

~~COME CLEAN~~ ~~BAY 200~~

Ultrasonic Clean. Fluid

Johnson Wax

SMITH & KLEBES, INC.
411 JOHN DOWNEY DRIVE
NEW BRITAIN, CONN. 06051

S.C. Johnson & Son, Inc.
Racine, Wisconsin 53403-5011
Phone: (414) 631-2777

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0230

owl 8/1/91

MATERIAL SAFETY

SECTION I — PRODUCT

Product Name:			
CCNE CLEAN			18210-006
Chemical or Common Name:	Date Issued:	Supercedes:	Prepared by:
NA	07/24/85	04/12/85	Gordon B. Bradshaw Materials Data Coordinator

SECTION II — INGREDIENT INFORMATION

	Weight %	Exposure Limit
Alkali Metasilicates and Carbonates	5-10	
Sodium Hydroxide (CAS #1310-73-2)	1-3	2 mg\m3
Trisodium NTA (CAS #5064-31-3) (NTP Listed - See Section X)	1-3	
Surfactants	4-6	
Formaldehyde (CAS# 50-00-0)	under 0.1	2 ppm (ceiling)
Colorant	under 0.1	
Water	balance	

SECTION III — PHYSICAL DATA

Appearance/Odor:	Yellow-green liquid with mild odor	Specific Gravity (H_2O = 1):	1.2
Vapor Pressure (mm Hg):	NA	Percent Volatile by Volume (%):	NA
Solubility in Water:	Complete	Vapor Density (Air = 1):	NA
Freezing Point (°F):	ND	Boiling Point (°F):	above 200
pH:	13 (Undiluted)	Evaporation Rate (Butyl Acetate = 1):	NA

SECTION IV — FIRE AND EXPLOSION INFORMATION

Flash Point (°F) (Method Used): NA	Flammable Limits: NA

Extinguishing Media: ☒ Foam ☒ CO_2 ☒ Dry Chemical ☒ Water Fog ☐ Other

Special Fire Fighting Procedures:
Normal fire fighting procedures may be used. Cool and use caution when approaching or handling fire-exposed containers.

Unusual Fire and Explosion Hazards:
Corrosive Material (See Sections VI, VIII). Container may burst in heat of fire.

SECTION VIII — SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify type): No special requirements under normal use conditions. If mists\vapors are not adequately controlled by local ventilation, use appropriate respiratory protection to prevent overexposures.

Ventilation: General room ventilation is normally adequate. Substantial amounts of mists\vapors can be controlled with local exhaust ventilation or respiratory protection.

Protective Gloves: If prolonged or repeated contact is possible: Rubber, PVC or other impervious material.

Eye Protection: Chemical workers splash-proof goggles where eye contact may be a problem.

Other Protective Measures: Use good personal hygiene practices. Where gross eye\skin contact may be a problem, wear\use appropriate protective equipment.

SECTION IX — SPECIAL PRECAUTIONS

Precautionary Labeling CAUTION: Eye irritant. Avoid contact with eyes. If eye contact occurs, flush with water. If irritation persists, contact physician. Avoid inhalation of product in spray application. Keep out of reach of children. Keep from freezing. Store at temperatures between 40 F and 100 F. Keep container closed when not in use.

Other Handling and Storage Conditions

Wash thoroughly after handling. Keep from freezing. Keep out of reach of children.

SECTION X — ADDITIONAL INFORMATION

For information on appropriate emergency procedures phone: **(414) 631-2000.**

Based upon ingestion of NTA in lifetime feeding studies, NTA has been shown to induce tumors in the urinary tracts of rats and mice. However, on a practical basis and according to guidelines for classification of experimental animal carcinogens of the American Conference of Government Industrial Hygienists (ACGIH), NTA would not be considered an occupational carcinogen of any practical significance.

NA-Not Applicable. NSR-No Special Requirement. ND-Not Determined for this product

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SAFET

OCEAN® Network
EMERGENCY PHONE 1-800-OLIN-911

SECTION I - IDENTIFICATION

CHEMICAL NAME & SYNONYMS Chlorinated trisodium phosphate		
CHEMICAL FAMILY Phosphate	**FORMULA** $Na_3PO_4/NaOCl$	**TRADE NAME** TSP-Cl
DESCRIPTION Fine white crystalline solid with faint chlorine odor		**CAS NO.** 56802-99-4

SECTION II - NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Avoid contact with eyes, skin or clothing. Do not take internally. Upon contact with skin or eyes, wash off with water. Avoid breathing dust. Store in a cool place. Keep containers closed when not in use. *Wear NIOSH/MSHA approved dust respirator if excessive dusting occurs.

PROTECTIVE EQUIPMENT	VENTILATION REQUIREMENTS
EYES Goggles **GLOVES** Rubber, neoprene **OTHER** See * above	Local mechanical exhaust ventilation recommended to minimize employee exposure.

SECTION III - HAZARDOUS INGREDIENTS

BASIC MATERIAL	OSHA PEL	LD50	LC50	SIGNIFICANT EFFECTS
Chlorinated trisodium phosphate	None Established	4.8 g/kg (rat)	>2.2 mg/l 1 hr(rat)	Burns to eyes, irritant to skin and mucous membranes

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD Not Applicable	**OSHA CLASSIFICATION** Not Regulated (Non-ignitable)	**FLAMMABLE EXPLOSIVE LIMIT**	**LOWER** N.D.	**UPPER** N.D.
EXTINGUISHING MEDIA Non-combustible - Choose extinguishing media suitable for surrounding materials.				
SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES Use NIOSH/MSHA approved self-contained breathing apparatus where this material is involved in a fire.				

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
None established

SYMPTOMS OF OVER EXPOSURE Nausea, vomiting, diarrhea, eye, skin, mucous membrane and gastrointestinal irritation.

EMERGENCY FIRST-AID PROCEDURES

SKIN Flush with water for 15 minutes. Call a physician.

EYES Flush with water for 15 minutes. Call a physician.

INGESTION Wash out mouth with water. Give plenty of water to drink. Do not induce vomiting. Call a physician.

INHALATION Remove victim to fresh air. Call a physician.

PRODUCT CODE 897079 CHEMICAL NAME TSP-C1

SECTION VI - TOXICOLOGY (PRODUCT)

ACUTE ORAL LD 50
4.8 g/kg (rats)
ACUTE DERMAL LD 50
> 3 g/kg (rabbits)
ACUTE INHALATION LC 50 > 2.16 mg/l inspired air for 1 hour (rats)

CARCINOGENICITY Not known to be carcinogenic
MUTAGENICITY Not known to be mutagenic
EYE IRRITATION Corrosive
PRIMARY SKIN IRRITATION
Irritant

PRINCIPAL ROUTES OF ABSORPTION
Inhalation

EFFECTS OF ACUTE EXPOSURE Nausea, diarrhea, vomiting, eye, skin, mucous membrane and gastrointestinal irritation.

EFFECTS OF CHRONIC EXPOSURE
None expected at industrial use levels.

SECTION VII - SPILL AND LEAKAGE PROCEDURES (CONTROL PROCEDURES)

ACTION FOR MATERIAL RELEASE OR SPILL
Wear NIOSH/MSHA approved self-contained breathing apparatus. Follow OSHA regulations for respirator use. (See 29 CFR 1910.134) Wear goggles, coveralls and neoprene or rubber gloves and boots. Shovel or sweep up and place in an approved DOT container and seal. Wash all contaminated clothing before reuse. In the event of a massive spill, use the emergency telephone number shown on the front of this sheet.

TRANSPORTATION EMERGENCY, CONTACT CHEMTREC 800-424-9300

WASTE DISPOSAL METHOD
Dispose of contaminated product, empty containers and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate Federal, State and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII - SHIPPING DATA

D.O.T. Sodium Phosphate, Tribasic ORM-E NA 9148 (Applicable for bulk shipments only)

SECTION IX - REACTIVITY DATA

STABLE X	**UNSTABLE** AT____C ____ F	**HAZARDOUS POLYMERIZATION**	**MAY OCCUR**
			WILL NOT OCCUR X

CONDITIONS TO AVOID
None known
INCOMPATIBILITY(MATERIAL TO AVOID)
None known
HAZARDOUS DECOMPOSITION PRODUCTS
Chlorine, phosphorus oxides

SECTION X - PHYSICAL DATA

MELTING POINT 144° F	**VAPOR PRESSURE** No Data	**VOLATILES** No Data
BOILING POINT Not applicable	**SOLUBILITY IN WATER** 18% @ 75°F	**EVAPORATION RATE** No Data
SPECIFIC GRAVITY(H2O=1) 1.6	**PH** 1%sol 11.9	**VAPOR DENSITY(AIR=1)** No Data

INFORMATION: FURNISHED TO

ATTN: DEPT HANDLING MATL SAFETY DATA SHEETS
CERRO COPPERPRODUCTS
PO BOX 681
EAST ST LOUIS ILL 62202
ATT. F BAKER OTTOFY

FURNISHED BY **DATE** JUNE 19, 1986

Department of Environmental Hygiene and Toxicology
(203) 789-5436

Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
OCEAN® Network
EMERGENCY PHONE 1-800-OLIN-911

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER CCPC-00-0240

Ouk 8/1/91

Super Filtrol Grade 1

CODE: J96400

MATERIAL SAFETY DATA SHEET

PRODUCT NAME
Super Filtrol Grade 1

H-33-84-WP

DATE: 02/02/87

SECTION I -- IDENTIFICATION

SUPPLIER'S NAME Harshaw/Filtrol Partnership

ADDRESS 30100 Chagrin Blvd.
Cleveland, Ohio 44124

EMERGENCY TELEPHONE 216/292-9200

CHEMICAL NAME Bentonite acid-leached powder

CAS No. 70131-50-9

U.N. No. Not applicable

FORMULA Proprietary

D.O.T. CLASSIFICATION Not regulated

SECTION II -- HAZARDOUS INGREDIENTS OF MIXTURES

Material or Component	%	THRESHOLD LIMIT VALUE ACGIH, 1986-87	OSHA PEL
Aluminum silicate	≅97	5 mg/m^3, resp.	5 mg/m^3
Crystalline silica (quartz) [14808-60-7]	≅3	0.1 mg/m^3, resp.	2.0 mg/m^3, resp.**

**Calculated according to OSHA, Table Z-3.

Unless otherwise noted, all values are reported as 8-hr Time-Weighted Averages (TWA's) and total dust (particulates only).

SECTION III -- PHYSICAL DATA

BOILING POINT Not applicable

MELTING POINT Not applicable

SPECIFIC GRAVITY (H_2O=1) 2.0

VAPOR PRESSURE Not applicable

VAPOR DENSITY (Air=1) Not applicable

SOLUBILITY IN H_2O (% by Wt.) Negligible

% VOLATILES BY VOLUME Not applicable

EVAPORATION RATE (Butyl Acetate=1) Not applicable

APPEARANCE AND ODOR Light greyish to off-white powder; odorless

SECTION IV -- FIRE AND EXPLOSION DATA

Not a fire or explosion hazard.

SECTION V -- HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV)/ PERMISSIBLE EXPOSURE LIMIT (PEL)
See Section II above.

EFFECTS OF OVEREXPOSURE
Eye contact may cause mechanical irritation.
Skin contact: No adverse effects expected.
Inhalation may cause irritation to respiratory tract and lung damage if exposure is repeated or prolonged.
Ingestion: No adverse effects expected.

EMERGENCY AND FIRST AID PROCEDURES
Eye contact: Flush eyes with plenty of water; if irritation develops, call a physician.
Inhalation: Remove to fresh air.

DATE: 02/02/87 — SECTION VI -- REACTIVITY DATA — CODE: J96400

CONDITIONS CONTRIBUTING TO INSTABILITY None expected

INCOMPATIBILITY None expected

HAZARDOUS DECOMPOSITION PRODUCTS None expected

SECTION VII -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Contain spillage and scoop up or vacuum. Avoid dusting.

WASTE DISPOSAL METHOD Federal, state and local disposal laws and regulations will determine the proper waste disposal procedure.

SECTION VIII -- PROTECTIVE EQUIPMENT

VENTILATION General; local exhaust ventilation as necessary to control dust.

PERSONAL PROTECTIVE EQUIPMENT A NIOSH/MSHA approved respirator as necessary
Safety Glasses (with side shields)

SECTION IX -- SPECIAL PRECAUTIONS

Avoid breathing dust.
Avoid contact with eyes.
Use with adequate ventilation.
Product becomes slippery when wet.

SECTION X -- PERSONNEL SAMPLING PROCEDURE

For crystalline silica: Refer to NIOSH Manual of Analytical Methods, 3rd Edition, Volume 2, Methods 7500, 7601, 7602.

ZEP MANUFACTURING COMPANY
FIRST IN MAINTENANCE PRODUCTS

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 ZEP HI FOAM DEGREASER
SUPERSEDES: 04/21/89 PRODUCT NUMBER: 0358

SECTION I - EMERGENCY CONTACTS

ZEP MANUFACTURING COMPANY
P.O. BOX 2015
ATLANTA, GEORGIA 30301
TELEPHONE (404)352-1680
BETWEEN 8:00A.M.-5:00P.M.
(EASTERN TIME ZONE)

NON-OFFICE HOURS, WEEKENDS, AND HOLIDAYS: AREA CODE 404
435-2973, 996-0899, 252-1567, 351-2952, 445-9226
LOCAL POISON CONTROL CENTER .....
TRANSPORTATION EMERGENCY
CHEMTREC: TOLL FREE 1-800-424-9300 ALL CALLS RECORDED
DISTRICT OF COLUMBIA (202)483-7616 ALL CALLS RECORDED

SECTION II - HAZARDOUS INGREDIENTS

DESIGNATIONS	TLV (PPM)	EFFECTS (SEE REVERSE)	% IN PROD.
** HEAVY AROMATIC NAPHTHA ** solvent naphtha (petroleum), heavy aromatics; CAS# 64742-94-5; RTECS# NONE; Supplier TWA- 100 ppm; OSHA PEL-N/D.	N/D	IRR CBL	30-40
** KEROSENE ** techsene; fuel oil #1; coal oil; CAS# 8008-20-6; RTECS# OA5500000; OSHA PEL-N/D	500	IRR CBL	10-20
** POTASSIUM DODECYLBENZENE SULFONATE ** linear alkyl aryl sulfonate; CAS# 27177-77-1; RTECS# NONE OSHA PEL N/D	N/D	IRR	5-10
** TETRAPOTASSIUM PYROPHOSPHATE ** TKPP; diphosphoric acid, tetrapotassium salt; CAS# 7320-34-5; RTECS# NONE; OSHA PEL-N/D.	N/D	IRR	< 5
@** ETHYLENE GLYCOL MONOBUTYL ETHER ** 2-butoxyethanol; butyl cellosolve; CAS# 111-76-2; RTECS# KJ 5000; OSHA PEL (SKIN)- 25 ppm	25	TOX IRR CBL	< 5

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0386

out 8/1/91

@ IDENTIFIES CHEMICALS LISTED UNDER SARA-SECTION 313 FOR RELEASE REPORTING.

SPECIAL NOTE: ADVERSE HEALTH EFFECTS WOULD NOT BE EXPECTED UNDER RECOMMENDED CONDITIONS OF USE SO LONG AS PRESCRIBED SAFETY PRECAUTIONS ARE PRACTICED.

SECTION III - HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE:
EXPOSURE BY INHALATION MAY PRODUCE EYE, NOSE, AND THROAT IRRITATION. INHALATION OF HARMFUL AMOUNTS OF VAPOR MAY PRODUCE MILD CENTRAL NERVOUS SYSTEM DEPRESSION, CHARACTERIZED BY HEADACHE, NAUSEA, VERTIGO, AND STUPOR. INTRODUCTION OF HYDROCA ON INTO THE LUNGS, AS IN ASPIRATION OF VOMITUS FLUIDS, MAY PRODUCE CHEMICAL PNEUMONIA. EXISTING RESPIRATORY DISORDERS OR SKIN DISEASES MAY BE AGGRAVATED BY EXPOSURE.
PRODUCT IN CONCENTRATED FORM IS A SEVERE EYE IRRITANT. OVER-EXPOSURE MAY LEAD TO EYE TISSUE DAMAGE WHICH CAN BE PERMANENT. SKIN CONTACT MAY PRODUCE IRRITATION.

SECTION VII - R E A C T I V I T Y D A T A

STABILITY : STABLE
INCOMPATIBILITY(AVOID) : HEAT, OPEN FLAME, SPARK, AND OXIDIZING AGENTS
POLYMERIZATION : WILL NOT OCCUR.
HAZARDOUS DECOMPOSITION: CARBON DIOXIDE, CARBON MONOXIDE, AND OTHER UNIDENTIFIED ORGANIC COMPOUNDS.

SECTION VIII - S P I L L A N D D I S P O S A L P R O C E D U R E S

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
IMMEDIATELY ELIMINATE ALL FLAME, IGNITION AND HIGH-HEAT SOURCES. ABSORB SPILL ON INERT ABSORBENT MATERIAL (eg ZEP-O-ZORB). PICK UP AND PLACE RESIDUE IN A CLEAN, D.O.T. SPECIFICATION CONTAINER FOR DISPOSAL. WASH AREA THOROUGHLY WITH A DETERGENT SOLUTION AND RINSE WELL WITH WATER.

WASTE DISPOSAL METHOD:
LIQUID WASTES ARE NOT PERMITTED IN LANDFILLS. PRODUCT IS NOT CONSIDERED A HAZARDOUS WASTE UNDER RCRA. UNUSABLE LIQUID MAY BE ABSORBED ON AN INERT ABSORBENT (e.g. ZEP-O-ZORB), DRUMMED AND TAKEN TO A CHEMICAL OR INDUSTRIAL LANDFILL. PRETREATMENT MAY BE REQUIRED BEFORE LANDFILLING. CONSULT LOCAL, STATE, OR FEDERAL AGENCIES FOR PROPER DISPOSAL IN YOUR AREA.

RCRA HAZ. WASTE NOS. : N/A

SECTION IX - S P E C I A L P R E C A U T I O N S

PRECAUTIONS TO BE TAKEN WHEN HANDLING AND STORING:
COMBUSTIBLE! STORE AND USE AWAY FROM HEAT, SPARKS, OPEN FLAME, OR ANY SOURCE OF IGNITION.
POST "NO SMOKING" SIGNS ACCORDING TO LOCAL REGULATIONS FOR COMBUSTIBLE LIQUIDS.
KEEP PRODUCT AWAY FROM SKIN AND EYES.
DO NOT BREATHE SPRAY MISTS OR VAPORS.
CLOTHING OR SHOES WHICH BECOME CONTAMINATED WITH SUBSTANCE SHOULD BE REMOVED PROMPTLY AND NOT REWORN UNTIL THOROUGHLY CLEANED.
STORE TIGHTLY CLOSED CONTAINER IN A DRY AREA AT TEMPS. BETWEEN 40-120 DEGREES F.
KEEP OUT OF THE REACH OF CHILDREN.

SECTION X - T R A N S P O R T A T I O N D A T A

DOT PROPER SHIPPING NAME
NONE
DOT HAZARD CLASS: N/A
DOT I.D. NUMBER : N/A DOT LABEL/PLACARD: NONE
EI TSCA CHEMICAL INVENTORY - ALL INGREDIENTS ARE LISTED
EPA CWA 40CFR PART 117 SUBSTANCE(RQ IN A SINGLE CONTAINER): N/A

ZEP MANUFACTURING COMPANY
F T IN MAINTENANCE PRODUCTS

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 ZEP DYNA 143
SUPERSEDES: 06/15/88 PRODUCT NUMBER: 0366

SECTION III - H E A L T H H A Z A R D D A T A (CONTINUED)

CHRONIC EFFECTS OF OVEREXPOSURE:
SKIN WHICH IS REPEATEDLY DEFATTED BY CONTACT WITH THIS PRODUCT MAY BE MORE SUSCEPTIBLE TO IRRITATION, INFECTION, OR DERMITITIS.
NONE OF THE HAZARDOUS INGREDIENTS ARE LISTED AS CARCINOGENS BY IARC, NTP, & OSHA

EST'D PEL/TLV: 200 PPM PRIMARY ROUTES OF ENTRY: INH, SKIN.

HMIS CODES: HEALTH 2; FLAM. 2; REACT. 0; PERS. PROTECT. B ; CHRONIC HAZ. YES

FIRST AID PROCEDURES:

SKIN : WASH CONTAMINATED SKIN THROUGHLY WITH SOAP OR A MILD DETERGENT. APPLY A SKIN CREAM WITH LANOLIN. GET MEDICAL ATTENTION IF IRRITATION PERSISTS.

EYES : IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, OCCASIONALLY LIFTING UPPER AND LOWER LIDS. GET MEDICAL ATTENTION AT ONCE.

INHALE: MOVE EXPOSED PERSON TO FRESH AIR. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION PROMPTLY.

INGEST: IF SWALLOWED, DO NOT INDUCE VOMITING. IF VOMITING OCCURS, KEEP HEAD BELOW HIP LEVEL. GET EMERGENCY MEDICAL ATTENTION IMMEDIATELY.

SECTION IV - S P E C I A L P R O T E C T I O N I N F O R M A T I O N

PROTECTIVE CLOTHING : WEAR NEOPRENE, NITRILE, OR NATURAL RUBBER GLOVES OR GLOVES WITH PROVEN RESISTANCE TO THE INGREDIENTS LISTED.

EYE PROTECTION : WEAR TIGHT-FITTING SPLASH-PROOF SAFETY GLASSES ESPECIALLY IF CONTACT LENSES ARE WORN.

RESPIRATORY PROTECTION: IF VENTILATION IS INADEQUATE, WEAR A PROPERLY FITTING MSA OR OSHA-APPROVED RESPIRATOR.

VENTILATION : VENTILATION SHOULD BE EQUIVALENT TO OUTDOORS. USE EXHAUST FANS AND OPEN WINDOWS IN ENCLOSED SPACES.

SECTION V - P H Y S I C A L D A T A

BOILING POINT (F)	: 368F INIT.	SPECIFIC GRAVITY	: .785
VAPOR PRESSURE(MMHG)	: <5	PERCENT VOLATILE BY VOLUME (%)	: 100
VAPOR DENSITY(AIR=1)	: 5.3	EVAPORATION RATE(BUTYL ACETATE =1)	: 0.14
SOLUBILITY IN WATER	: INSOLUBLE	PH(CONCENTRATE)	: N/A
		PH(USE DILUTION OF)	: N/A

APPEARANCE AND ODOR : A CLEAR, WATER-WHITE LIQUID WITH A MILD ODOR.

SECTION VI - F I R E A N D E X P L O S I O N D A T A

FLASH POINT(F) (METHOD USED): 143F (TCC)
FLAMMABLE LIMITS LEL 1% UEL 7%
EXTINGUISHING MEDIA : WATER FOG, CO2, FOAM, DRY CHEMICAL
SPECIAL FIRE FIGHTING: SELF-CONTAINED BREATHING APPARATUS
UNUSUAL FIRE HAZARDS : DIRECT WATER ONTO INTACT CONTAINERS TO PREVENT BURSTING.

ZEP MANUFACTURING COMPANY
FIRST IN MAINTENANCE PRODUCTS

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 ZEP DYNA 143
SUPERSEDES: 06/15/88 PRODUCT NUMBER: 0366

SECTION I - EMERGENCY CONTACTS

ZEP MANUFACTURING COMPANY
P.O. BOX 2015
ATLANTA, GEORGIA 30301
TELEPHONE (404)352-1680
BETWEEN 8:00A.M.-5:00P.M.
(EASTERN TIME ZONE)

NON-OFFICE HOURS, WEEKENDS, AND HOLIDAYS: AREA CODE 404
435-2973, 996-0899, 252-1587, 351-2952, 445-9226
LOCAL POISON CONTROL CENTER .....
TRANSPORTATION EMERGENCY
CHEMTREC: TOLL FREE 1-800-424-9300 ALL CALLS RECORDED
DISTRICT OF COLUMBIA (202)483-7616 ALL CALLS RECORDED

SECTION II - HAZARDOUS INGREDIENTS

DESIGNATIONS	TLV (PPM)	EFFECTS (SEE REVERSE)	% IN PROD.
** LIGHT ALIPHATIC NAPHTHA ** solvent naphtha (petroleum), medium aliphatics; CAS# 64742-68-7; RTECS# NONE	200	TOX IRR CBL	>90

SPECIAL NOTE: ADVERSE HEALTH EFFECTS WOULD NOT BE EXPECTED UNDER RECOMMENDED CONDITIONS OF USE SO LONG AS PRESCRIBED SAFETY PRECAUTIONS ARE PRACTICED.

SECTION III - HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE:
OVER-EXPOSURE TO THE VAPORS FROM THIS PRODUCT MAY PRODUCE MUCOUS MEMBRANE IRRITATION, PARTICULARLY OF THE EYE AND RESPIRATORY TRACT. OVER-EXPOSURE TO VAPORS MAY ALSO PRODUCE MILD CENTRAL NERVOUS SYSTEM DEPRESSION CHARACTERIZED BY HEADAC , DIZZINESS, NAUSEA, AND STUPOR, LEADING TO UNCONSCIOUSNESS IN EXTREME CASES. INTRODUCTION OF SOLVENTS, AS IN ASPIRATION OF VOMITUS FLUID, MAY PRODUCE CHEMICAL PNEUMONIA. EXISTING RESPIRATORY DISORDERS AND LUNG DISEASES MAY BE AGGRAVATED BY INHALATION OF VAPORS.

REACTIVITY DATA (CONTINUED)

Hazardous Decomposition Products: None

Hazardous Polymerization:

May Occur	
Will Occur	X

Conditions To Avoid: N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Ventilate area of spill. Clean up using methods which avoid dust generation such as vacuum (with appropriate filter to prevent airborne dust levels which exceed the PEL or TLV), wet dust mop or wet clean-up. If airborne dust is generated, use an appropriate NIOSH approved respirator.

WASTE DISPOSAL METHOD:

Dispose of in accordance with appropriate government regulations. May be sold as scrap for reclaim.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Use an appropriate NIOSH approved respirator if airborne dust concentrations exceed the appropriate PEL or TLV. All appropriate requirements set forth in 29 CFR 1910.134 should be met.

VENTILATION:

Use local exhaust ventilation which is adequate to limit personal exposure to airborne dust to levels which do not exceed the PEL or TLV. If such equipment is not available use respirators as specified above.

PROTECTIVE GLOVES:

Protective Gloves or Barrier Cream are recommended when contact with dust or mist is likely. Prior to applying the barrier cream or use of protective gloves, wash thoroughly.

EYE PROTECTION:

Safety glasses with side shields or goggles are recommended.

OTHER PROTECTIVE EQUIPMENT: N/A

SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Maintain good housekeeping procedures to prevent dust accumulation. Avoid dust inhalation and direct skin contact with dust.

SPECIAL PRECAUTIONS (CONTINUED)

OTHER PRECAUTIONS:

Clean up using methods which avoid dust generation such as vacuum (with appropriate filter to prevent airborne dust levels which exceed the PEL or TLV), wet dust mop or wet clean-up. If airborne dust is generated, use an appropriate NIOSH approved respirator. Do not use coolant for wet clean up.

Wash hands thoroughly after handling, before eating or smoking. Wash exposed skin at the end of work shift. Do no shake clothing, rags or other items to remove dust. Dust should be removed by washing or vacuuming (with appropriate filters) the clothing, rags, or other items.

Periodic medical examinations are recommended for individuals regularly exposed to dust or mist.

USER'S RESPONSIBILITIES

This Material Safety Data Sheet provides information consistent with recommended applications of this product and anticipated non-routine activities involving the product. It is the user's responsibility to identify and protect against health and safety hazards presented by modification of cemented carbide products or powders after manufacture. Individuals handling cemented carbide products or powders should be informed of all relevant hazards and recommended safety precautions, and should have access to the information contained in this MSDS.

IN CASE OF QUESTIONS, PLEASE CALL FEDERAL CARBIDE COMPANY'S SAFETY DIRECTOR: 201-935-4630

FEDERAL CARBIDE COMPANY
66 GRAND STREET
P.O. BOX 228
MOONACHIE, NJ 07074

FEDERAL CARBIDE COMP

MATERIAL SAFETY DATA S

CHEMICAL NAME:	**Cemented Tungsten Carbide Product with Cobalt/Nickel Binder**	**Issued: June 30, 1989** **Supersedes: November 15, 1985**
TRADE NAME & SYNONYMS:	**All Federal Carbide Grades**	
CHEMICAL FAMILY:	**Refractory Metal Carbide**	
MOLECULAR WEIGHT:	**N/A**	
NFPA HAZARD RATING:	**Health 2; Flammability 0; Reactivity 0; Personal Protection 1**	

PHYSICAL DATA

Appearance and Odor:	Dark Gray Metal/No Odor		
Boiling Point:	N/A	**Specific Gravity (H_2O=1):**	5.4 to 15.5
Vapor Pressure:	N/A	**Percent Volatile by Volume:**	0
Vapor Density	N/A	**Evaporation rate:**	N/A
Solubility in Water:	Insoluble	**How Best Monitored:**	Air Sample

HAZARDOUS INGREDIENTS

Material	(CAS #)	Percent By Weight	OSHA PEL	ACGIH TLV
ungsten (limits for Tungsten dust)	(7440-33-7)	67-97% *	5 mg/m^3	5 mg/m^3
Cobalt	(7440-48-4)	3-30% *	0.05 mg/m^3	0.05 mg/m^3
Tantalum (limits for Tantalum dust)	(7440-25-7)	0.0-50% *	5 mg/m^3	5 mg/m^3
Chromium Carbide (limits for Chromium dust)	(7440-47-3)	0.0-5.1% *	0.5 mg/m^3	0.5 mg/m^3
Nickel	(7440-02-0)	1-15% *	1 mg/m^3	1 mg/m^3

*Depends on grade specifications

HEALTH HAZARD DATA

Note: During normal operation and usage, cemented carbide products do not present inhalation, ingestion, or other chemical hazards of any kind. However, operations such as grinding of such products may release dusts or vapors which may present health hazards if the exposure limits described are exceeded. The health hazards described below relate to these non-routine operations, as well as exposure to components of powder.

Routes of Exposure: Grinding cemented tungsten carbide product with Cobalt/Nickel binder may produce potentially hazardous dust which can be inhaled, swallowed or come in contact with the skin or eyes.

Effects of Overexposure:

Inhalation - Dust can cause irritation of the nose and throat. Some studies associate periodic inhalation of this respirable dust with the potential for transient respiratory reaction in Cobalt hypersensitized individuals and prolonged excessive inhalation of respirable dust or mist with transient, permanent or fatal respiratory disease. Adverse reactions are purportedly due to the Cobalt ingredient. Nickel is suspected of causing nasal and lung cancer.

HEALTH HAZARD DATA (CONTINUED)

Skin Contact - Can cause irritation or transient allergic skin rash in Cobalt hypersensitized individuals.

Eye Contact - Can cause mild pain or irritation.

Ingestion - No current scientific studies indicate adverse effects from ingestion of small quantities of dust.

Emergency and First Aid Procedures: Applicable for dusts or mists

Inhalation - If symptoms of pulmonary involvement develop (coughing, wheezing, shortness of breath, etc.), remove exposure and seek medical attention.

Skin Contact - If irritation or rash occurs, thoroughly wash affected area with soap and water and isolate from exposure. If irritation or rash persists, seek medical attention.

CARCINOGENIC ASSESSMENT (NTP ANNUAL REPORT, IARC MONOGRAPHS, OTHER):
Nickel has been identified as a suspected carcinogens by NTP, IARC, and OSHA

FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A **Test Method Used:-** **Flammable Limits: N/A** **LEL:-** **UEL:-**
Tungsten Carbide Grade Powder is not a fire hazard. Dusts may ignite if allowed to accumulate and subjected to an ignition source.

EXTINGUISHING MEDIA:

For powder fires use dry sand, dry dolomite, ABC type fire extinguisher, or flood with water.

SPECIAL FIRE FIGHTING PROCEDURES:

For a powder fire confined to a small area, use a respirator approved for toxic dusts and fumes. For a large fire, fire fighters should use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Dusts may present a fire or explosion hazard under rare favoring conditions of particle size, dispersion and strong ignition source. However, this is not expected to be a problem under normal conditions.

REACTIVITY DATA

Stability:

Unstable	
Stable	**X**

Conditions to Avoid: N/A

Incompatibility: Contact of dust with strong oxidizers may cause fire or explosions.

Materials to Avoid: Strong acids

Polymerization: Polymerization is not expected to occur.
Avoid: Not applicable.

SECTION VI HEALTH HAZARD DATA

ROUTES OF ENTRY

Eyes? YES Skin? NO Inhalation? YES Ingestion? NO

EFFECTS OF OVEREXPOSURE

EYE CONTACT may cause mechanical irritation if exposed to large amounts of dust.

SKIN CONTACT: No adverse effects expected.

INHALATION may cause irritation to respiratory tract and lung damage if exposure is repeated or prolonged.

INGESTION: No adverse effects expected.

CARCINOGENICITY

NTP? NO IARC? YES OSHA? NO

CRYSTALLINE SILICA is listed by the International Agency for Research on Cancer (IARC) as a 2A: Sufficient evidence in laboratory animals and limited evidence of carcinogencity in humans.

CHRONIC HEALTH HAZARDS

Refer to Effects of Overexposure and Carcinogenicity.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

None known.

EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: Flush eyes with plenty of water. If irritation develops, call a physician.

SKIN CONTACT: Procedures normally not needed. If skin contact occurs flush with plenty of water. If irritation develops, call a physician.

INHALATION: Remove to fresh air.

INGESTION: Procedures normally not needed. If large quantities are ingested, seek medical advice.

SECTION VII PRECAUTIONS FOR SAFE HANDLING AND USE

EPA Waste #: Not regulated
UN #: Not applicable
DOT Classification: Not regulated

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Contain spillage and scoop up or vacuum. Avoid dusting.

WASTE DISPOSAL METHOD

Federal, state and local disposal laws and regulations will determine the proper waste disposal procedure.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Product becomes slippery when wet.

PERSONNEL SAMPLING PROCEDURE

For CRYSTALLINE SILICA: Refer to NIOSH Manual of Analytical Methods, 3RD Edition, Volume 2, Methods 7500, 7601 and 7602.

SECTION VIII CONTROL MEASURES

RESPIRATORY PROTECTION

A NIOSH/MSHA-approved respirator as necessary.

VENTILATION

General; local exhaust ventilation as necessary to control any air contaminants, to within their TLVs, in the use of this product.

PROTECTIVE EQUIPMENT

Safety glasses (with side shields).

WORK/HYGIENE PRACTICES

Avoid breathing dust.
Avoid contact with eyes.
Use only with adequate ventilation.

ENGELHARD

ode: J96400
ate: 09-29-89

MATERIAL SAFETY DATA SHEET

Product: SUPER FILTROL GRADE 1

SECTION I SUPPLIER INFORMATION

Common Name : BENTONITE ACID-LEACHED POWDER
Chemical Name : BENTONITE ACID-LEACHED POWDER
Formula : CHEMICAL MIXTURE
Product CAS # : 70131-50-9
Supplier : ENGELHARD CORPORATION, PIGMENTS AND ADDITIVES DIVISION, SPECIALTY MINERALS AND COLORS GROUP
Address : 29001 SOLON ROAD
City, St, Zip : SOLON, OH 44139
Phone : 216-292-9200

EMERGENCY PHONE #: 216-292-9200

SECTION II HAZARDOUS INGREDIENT INFORMATION

INGREDIENT	% Wt.	PEL-OSHA	TLV-ACGIH
ALUMINUM SILICATE CAS #: 1332-58-7	97	None established	10 mg/m³, Total dust
SILICA, CRYSTALLINE (QUARTZ) CAS #: 14808-60-7	1-3	0.1 mg/m³, Respirable	0.1 mg/m³, Respirable

INGREDIENT HAZARD STATEMENT

SUSPECT CANCER HAZARD - Risk of cancer depends on duration and level of exposure.
Prolonged or repeated inhalation may cause lung damage.
May cause eye and respiratory tract irritation.
Unless otherwise noted, all values are reported as 8-hour Time-Weighted Averages (TWAs) and total dust (particulates only). All ACGIH TLVs refer to the 1988-89 Standards. All OSHA PELs refer to 29 CFR Part 1910 Air Contaminants: Final Rule, January 19, 1989.

SECTION III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: Not applicable
Specific Gravity (H_2O=1): 2.0
Melting Point: Not applicable

Vapor Pressure (mm Hg): Not applicable
Vapor Density (Air=1): Not applicable
Evaporation Rate (Butyl Acetate=1): Not applicable
% Solubility/Water: Negligible

APPEARANCE AND ODOR

Light grey to off-white powder; odorless

SECTION IV FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not available
Auto-Ignition: Not available
LEL: Not available
UEL: Not available

NFPA HAZARD CLASSIFICATION

Health: 0 Flammable: 0 Reactivity: 0

HMIS HAZARD CLASSIFICATION

Health: 0* Flammable: 0 Reactivity: 0

EXTINGUISHING MEDIA

Use water, carbon dioxide or foam.

SPECIAL FIRE FIGHTING PROCEDURES

None expected.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Not a fire or explosion hazard.

SECTION V REACTIVITY DATA

Stability: Generally considered stable.
Avoid: None expected.

INCOMPATIBILITY (Materials to Avoid)

None expected.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS

None expected.

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)* KEN PRIDE 210A LF

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name Elam Chemical Company, Inc.	**Emergency Telephone Number** (314) 938-4588
Address *(Number, Street, City, State, and ZIP Code)* P. O. Box 360, Eureka, MO 63025-0360	**Telephone Number for Information** (314) 938-4588
	Date Prepared 06/01/89
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
None				

Section III — Physical/Chemical Characteristics

Boiling Point	212	Specific Gravity (H_2O = 1)	N/A
Vapor Pressure (mm Hg)	N/A	Melting Point	N/A
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water: In any proportions

Appearance and Odor: Clear - Green - Pine

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	None	Flammable Limits	None	LEL N/A	UEL N/A

Extinguishing Media: None

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

Section V — Reactivity Data

Stability			Conditions to Avoid
XX	Unstable		None
	Stable	X	

Incompatibility (*Materials to Avoid*) None

Hazardous Decomposition or Byproducts None

Hazardous Polymerization			Conditions to Avoid
	May Occur		None
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
	No	Yes	Yes

Health Hazards (*Acute and Chronic*) None

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
	None	None	No

Signs and Symptoms of Exposure Causes defatting of skin if not flushed off with water.

Medical Conditions
Generally Aggravated by Exposure

Emergency and First Aid Procedures

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled Mop up - flush down drain

Waste Disposal Method Normal - Nearest drain

Precautions to Be Taken in Handling and Storing Store in cool place

Other Precautions None

Section VIII — Control Measures

Respiratory Protection (*Specify Type*) None

Ventilation				
	Local Exhaust	OK	Special	NO
	Mechanical (*General*)	OK	Other	NO

Protective Gloves	Eye Protection
Suggested	Suggested

Other Protective Clothing or Equipment None

Work/Hygienic Practices Normal

• USGPO 1988-491-529/45775

SECTION IX FEDERAL AND STATE REGULATIONS

SARA HAZARD CATEGORIES

IMMEDIATE (Acute) Health Hazard: NO
DELAYED (Chronic) Health Hazard: YES
FIRE Hazard: NO
REACTIVITY Hazard: NO
Sudden Release of PRESSURE: NO

SARA SECTION 313 NOTIFICATION

This product does not contain toxic chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

STORAGE TEMPERATURE 110 F.<--MAX 40 F.<--MIN	INDOOR X	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
STORE BELOW 75 F. FOR MAXIMUM SHELF LIFE.

OTHER PRECAUTIONS
KEEP OUT OF REACH OF CHILDREN.
READ ENTIRE LABEL BEFORE USING PRODUCT.

SECTION XI - REGULATORY INFORMATION

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
N/A		

THOSE INGREDIENTS LISTED ABOVE ARE SUBJECT TO THE REPORTING REQUIREMENTS OF 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.
IF UE (USE EXEMPTION) APPEARS UNDER UPPER % LIMIT, END USERS ARE EXEMPT FROM NOTIFICATION BECAUSE THE PRODUCT IS USED AND LABELED FOR ROUTINE JANITORIAL WORK, OR THE PRODUCT IS USED AND LABELED FOR FACILITY GROUNDS MAINTENANCE (SUCH AS FERTILIZERS AND HERBICIDES), OR THE PRODUCT IS USED AND LABELED FOR MAINTAINING MOTOR VEHICLES.

SECTION XII - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS	ID NUMBER	REPORT QTY
LABELS	LIMITED QTY	
UNIT CONTAINER		
DOT SPS CONTAINER	NET EXPLOSIVE WT.	
AEROSOL PROPELLANT(S)		

1. VENDOR'S MSDS.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE IN LIGHT OF CURRENT FORMULATION. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THIS DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH ASSUMES NO RESPONSIBILITY FOR PERSONAL INJURY OR PROPERTY DAMAGE CAUSED BY THE USE, STORAGE OR DISPOSAL OF THE PRODUCT IN A MANNER NOT RECOMMENDED ON THE PRODUCT LABEL. USERS ASSUME ALL RISKS ASSOCIATED WITH SUCH UNRECOMMENDED USE, STORAGE, OR DISPOSAL OF THE PRODUCT.

(023828-0271● -40135925-67004910)	DATE OF ISSUE 05/20/88	SUPERSEDES 11/11/87

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS	TRADE NAME & SYNONYMS
N/A	INSTANT ADHESIVE

CHEMICAL FAMILY	FORMULA
METHACRYLATE	X<--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
RICHARD STOLLEY/T.S.CHEM.	67004910	214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV●	PEL●	CAS#
POLY METHYL METHACRYLATE	IRRITANT	N/A	N/A	9011-14-7
ETHYL CYANOACRYLATE	SKIN IRR.	2 PPM 1.	N/A	7085-85-0

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	>300 F.	SPEC GRAVITY (H20=1)	:1.050
VAPOR PRESSURE (MM HG).	<0.2	COLOR	CLEAR LIQUID

VAPOR DENSITY (AIR=1)	3	ODOR	SHARP IRRITATING
PH @ 100%	N/A	CLARITY	TRANSPARENT
PERCENT VOLATILE BY VOLUME (%)	N/A	EVAPORATION RATE (BU AC = 1)	0.10
SOLUBILITY IN WATER	NEGLIGIBLE		
VISCOSITY	SEMI-VISCOUS		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
>200 F. T.C.C.	N/A		

EXTINGUISHING MEDIA "ALCOHOL" DRY WATER
X<--FOAM <--FOAM X<--CO2 X<--CHEMICAL <--SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES

N/A

UNUSUAL FIRE & EXPLOSION HAZARDS

N/A

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
3 <--HEALTH 1 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

2PPM ESTIMATED 1.

EFFECTS OF OVEREXPOSURE

- ACUTE - (SHORT TERM EXPOSURE)

SKIN IRRITATION, DERMATITIS AND ADHESION.
IF INTRODUCED INTO THE EYES, WEEPING WILL OCCUR AND POSSIBLE DOUBLE VISION.
A LARGE DROP MAY CAUSE THERMAL BURNS.

- CHRONIC - (LONG TERM EXPOSURE)

SKIN IRRITATION DERMATITIS AND ADHESION LENDING ITSELF TO LOSS OF SKIN TISSUE.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION <-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :

SEEK FRESH AIR. OBTAIN MEDICAL ATTENTION.

EYE CONTACT:

EYELID TO EYEBALL ADHESION: WASH THOROUGHLY WITH WARM WATER AND APPLY GAUZE PATCH. EYE WILL OPEN IN 4 DAYS. DO NOT OPEN EYES BY MANIPULATION. ADHESIVE ON EYEBALL:WILL ATTACH TO PROTEIN AND WILL DISASSOCIATE OVER A PERIOD OF SEVERAL HOURS. WILL CAUSE WEEPING AND DOUBLE VISION. THE PRECEDING IS TRUE EVEN WITH GROSS CONTAMINATION.

SKIN CONTACT:

SKIN ADHESION: IMMERSE BONDED SURFACE IN WARM SOAPY WATER. PEEL AND ROLL SURFACE WITH BLUNT EDGE, THEN REMOVE ADHESION WITH SOAP AND WATER.

INGESTION :

DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. SEEK MEDICAL ATTENTION. IF LIPS ARE STUCK TOGETHER, APPLY WARM WATER ENCOURAGE MAXIMUM WETTING AND PRESSURE FROM SALIVA INSIDE THE MOUTH. PEEL OR ROLL LIPS APART. DO NOT TRY AND PULL THE LIPS WITH DIRECT OPPOSING ACTION. IT IS ALMOST IMPOSSIBLE TO SWALLOW PRODUCT AS IT HARDENS IN THE MOUTH.

NOTES TO PHYSICIAN :

IT SHOULD NEVER BE NECESSARY TO USE SUCH DRASTIC MEASURE SUCH AS SURGERY TO SEPARATE ACCIDENTLY BONDED SKIN.

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

POLY (METHYL METHACRYLATE) HAS BEEN SHOWN TO CAUSE TUMORS IN EXPERIMENTAL ANIMALS WHEN IMPLANTED BENEATH THE SKIN.
IN LIGHT OF THE LOW CONCENTRATION OF THIS COMPONENT IN THE PRODUCT, IT IS OUR BEST TECHNICAL JUDGEMENT THAT NORMAL USE OF THIS PRODUCT POSES NO SUCH HAZARDS.
THIS WARNING IS PRESENT ONLY TO COMPLY WITH OSHA REGULATIONS.
ORL-RAT LD50: > 5000MG/KG 1.
SKN-RBT LD50: > 2000MG/KG 1.

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
STABILITY			
	N/A		

INCOMPATIBILITY (MATERIALS TO AVOID)

WATER, ALCOHOLS, AMINES, ALKALINES.

HAZARDOUS DECOMPOSITION PRODUCTS

CYANIDES

	WILL NOT	MAY	CONDITIONS TO AVOID
HAZARDOUS	X <--OCCUR	<--OCCUR	
POLYMERIZATION	N/A		

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
FLOOD WITH WATER TO POLYMERIZE. SOAK UP WITH INERT ABSORBANT.

WASTE DISPOSAL METHOD
LANDFILL OR INCINERATE IN ACCORDANCE WITH EPA AND LOCAL REGULATIONS.

NEUTRALIZING AGENT

N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
GENERAL EXHAUST IS USUALLY ADEQUATE.

RESPIRATORY PROTECTION
LOCAL VENTILATION IS ADEQUATE.

PROTECTIVE GLOVES
POLYETHYLENE GLOVES

EYE PROTECTION
SAFETY GLASSES OR GOGGLES ARE MANDATORY.

OTHER PROTECTION
N/A

STORAGE CONDITIONS

Store in well ventilated area. Keep container tightly closed. Do not store or consume food, drink or tobacco in area where they may become contaminated with this material.

****

ADDITIONAL INFORMATION AND REFERENCES

Material Identification-CAS Name (Cont'd.):
2-Chloro-N-[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino carbonyl]benzenesulfonamide

****

Date of latest Revision : 86/02/28
Person Responsible for MSDS : Registration & Regulatory Aff.
Agricultural Products Dept.
Wilmington, DE 19898

(PROTECTION INFORMATION - CONTINUED)

Personal Protective Equipment

Eye/Face : Coverall chemical splash goggles.

Respirator :
Filter Respirator : Approved pesticide respirator if exposure may exceed AEL value.

Additional : Protective clothing

****

DISPOSAL INFORMATION

Aquatic Toxicity : Rainbow Trout LD50 (96) greater than 250 ppm.

Spill, Leak, or Release

NOTE: Review FIRE AND EXPLOSION HAZARDS and SAFETY PRECAUTIONS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.
Dike spill. Prevent liquid from entering sewers, water ways or low areas. Soak up with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up.

Waste Disposal

Treatment, storage, transportation and disposal must be in accordance with Federal, State, and Local regulations. Remove nonusable solid material and/or contaminated soil, for disposal in an approved and permitted landfill. Do not flush to surface water or sanitary sewer system.
Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incinerator, or if allowed by State and local authorities by burning.

****

SHIPPING INFORMATION

Domestic - Other than Air (DOT)
Name : Weed Killing Compound, N.O.I.B.N.

Special Information : Not regulated under D.O.T.

Additional Information

(HEALTH HAZARD INFORMATION - CONTINUED)

MUTAGENICITY: Not mutagenic in Ames bacterial assay, Chinese Hamster Ovary mammalian cell assay, rat dominants lethal assay, in vitro cytogenetic assay, or DNA repair assay.

Carcinogenicity
None of the components in this chemical is listed by IARC, NTP, or OSHA as a carcinogen.

Exposure Limits

AEL (DuPont) : 10 mg/cu. M (8 and 12 hr TWA)
TLV * (ACGIH) : None Established
PEL (OSHA) : None Established

* TLV is a registered trademark.

Safety Precautions

Avoid breathing vapors or mist. Avoid contact with eyes. Avoid contact with skin. Avoid contact with clothing. Avoid breathing dust. Wash thoroughly after handling.

****

FIRST AID

INHALATION
If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT
Flush skin with water after excessive contact.

EYE CONTACT
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION
If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. Call a physician.

****

PROTECTION INFORMATION

Generally Applicable Control Measures and Procedures

Use only with adequate ventilation. Keep away from heat, sparks and flames. Keep container tightly closed. Do not consume food, drink or tobacco in the areas where they may become contaminated with this material.

(FIRE AND EXPLOSION DATA - CONTINUED)

EXTINGUISHING MEDIA

Water Spray. Dry Chemical.

SPECIAL FIRE FIGHTING INSTRUCTIONS

Wear self-contained breathing apparatus. Cool tank/container with water spray.

****

OTHER PHYSICAL HAZARDS

If area is heavily exposed to fire and if conditions permit, let fire burn itself out since water may increase the area contaminated.

****

HEALTH HAZARD INFORMATION

Principal Health Hazards

CAUTION! May irritate eyes, nose and throat.

ROUTES OF EXPOSURES AND EFFECTS:
ORAL (fasted rat): LD50 3,053 mg/kg (male); 2,341 mg/kg (female)

DERMAL (rabbit): (Active ingredient) LD50 greater than 3,400 mg/kg.

SKIN IRRITATION AND SENSITIZATION: (Active ingredient) Not a skin irritant (rabbits) or a sensitizer (guinea pigs).

EYE CONTACT: Administration of 10 mg to rabbit eye produced very mild temporary conjunctival irritation.

Other Health Hazards

CHRONIC STUDIES:

CHRONIC ORAL-No observable effect levels of 100 ppm in the diets of rats for 2 year and 500 ppm in the diet of mice for 2 years. No oncogenic effects at any level; highest level fed was 2,500 ppm rats and 5,000 ppm mice.

REPRODUCTION: (rats) The dietary presence of chlorsulfuron at 500 ppm had no adverse effect on the reproduction or lactation performance of young adult rats (3-generation, 2-litters per generation).

TERATOGENICITY: Not teratogenic in rats at 2,500 ppm or up to 75 mg/kg in rabbits.

DUPONT

MATERIAL SAFETY DATA SHEET

FOR

MUG-A-BUG
RT. 51 NORTH BOX 78
FORSYTH, IL 62535
217 875-3303

MATERIAL IDENTIFICATION

NUMBER : M0000026
NAME : "Telar" Herbicide

GRADE : 75% Formulation
CHEMICAL FAMILY : Sulfonylureas

CAS NAME : (See Additional Information Section)

MANUFACTURER/DISTRIBUTOR : E.I. du Pont de Nemours & Co., Inc.
1007 Market Street
Wilmington, DE
19898

PRODUCT INFORMATION PHONE : 1-(800)441-7515
TRANSPORTATION EMERGENCY PHONE (CHEMTREC) : 1-(800)424-9300
MEDICAL EMERGENCY PHONE : 1-(800)441-3637

****

HAZARDOUS COMPONENTS

aterial	CAS Number	%
Chlorsulfuron	64902-72-3	75

****

PHYSICAL DATA

Melting Point : 174 to 178 deg C (A.I.)
Specific Gravity : 0.59 at 25 deg C.
Vapor Pressure : Nil. mm Hg at 25 deg C.
Solubility in Water : Disp.
Odor : None
Form : Solid
Color : White to tan
Dry flowable granules. Bulk Density 30 to 36 lb/cu. ft.

****

HAZARDOUS REACTIVITY

Instability : Stable.
Incompatibility : None reasonably forseeable.
Decomposition : Decomposes with heat.
Polymerization : Polymerization will not occur.

****

FIRE AND EXPLOSION DATA

May be ignited by heat or open flame.

FIRE AND EXPLOSION HAZARDS

Dust forms explosive mixture with air.

SECTION VI - HEALTH HAZARD DATA (Cont'd)

Ingestion:
Not hazardous when ingested. May cause temporary irritation to GI tract.

Carcinogenicity According to NTP, IARC, OSHA:
Not Applicable

NOTE:
The heat gererated by cutting, sanding, or grinding FRP products may be sufficent to cause styrene vapors to be emitted. When emitted, lab analysis has shown these vapors to be 2 to 15 ppm which is well below the recommended limits set by OSHA, ACGIH, and NIOSH. Still, care should be taken when cutting, sanding, or grinding FRP products and there should be adequate ventilation. Styrene is listed as a potential carcinogen by IARC. Neither the data from various long-term animal studies nor from epidemiology of workers exposed to styrene provide an adequate basis to conclude that styrene is carcinogenic.

Emergency and First Aid Procedures:
If inhaled, get fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

In case of eye contact, flush eyes with plenty of water. Consult a physician. In case of skin contact, wash throughly with soap and water.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Warning Statements:
*Contains Fiberous Glass CAS# 65997-17-3 and Styrene CAS# 100-42-5. Dusts may cause allergic skin or respiratory reaction in sensitized persons.
*Dusts are irritating to eyes.

Precautionary Measures:
*Avoid contact with eyes, skin, and clothing. Wear gloves, eye protection, and work clothes.
*Sand, cut, and grind where there is adequate ventilation.
*Wash thourghly after handling.

Steps to be Taken in Case Material is Released or Spilled:
Not Applicable

Waste Disposal Method:
*Waste generated by cutting, sanding, and grinding FRP products are not considered hazardous under RCRA.
*Dispose of waste in accordance with all applicable local, state, and federal government regulations.

SECTION VIII - CONTROL MEASURES

Respiratory Protection: Where ventilation is unavailable to maintain exposures below the TLV's (see Section II) the use of an approved (NIOSH/OSHA) dust and/or organic vapor respirator may be necessary.

Ventilation:

Local Exhaust:	As Needed
Mechanical:	As Needed
Special:	Not Applicable
Other:	Not Applicable

Protective Gloves: Mandatory - recommend heavy cloth or leather work glove.

Eye Protection: Safety glasses or goggles are mandatory.

Other Protective Clothing/Equipment: Wear appropriate work clothes to cover exposed skin surfaces.

Work/Hygenic Practices:

Observe all precautions and use instructions included on this Material Safety Data Sheet.

For those FRP products that come with repair kits, refer to the MSDS's supplied with the kits for proper handling procedures.

MATERIAL SAFETY DATA SHEET

Composite Technology, Inc.
A Unit of W. R. Grace & Co. - Conn.
1005 Blue Mound Road
Fort Worth, Texas 76131

MSDS Number: FRP-287
Cancels: New MSDS
Date Prepared: 10-27-89

Telephone Number for Information and Emergency Response: (817) 232-1127

SECTION I - PRODUCT IDENTIFICATION

Trade Names and Synonyms:	Fiberglass Reinforced Plastics (FRP Poducts)
Chemical Name and Family:	Plastics
Formula:	Mixture
CAS Number:	Not Applicable (Mixture)
DOT Hazard Class/ID#/Label:	Not Applicable
Reportable Quantity (RQ):	Not Applicable
Surface Freight Classification:	60
NPCA - HMIS Hazard Index:	*Health: 1* *Flammability: 1 *Reactivity: 0 *Personal Protection: B,E

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Ingredient	CAS #	Percent by Weight	Exposure Limits
Fiberous Glass	65997-17-3	30 - 75%	OSHA - 5mg/m^3 Respirable Dust ACGIH - 10mg/m^3 Total Dust NIOSH - 3 fibers/cc
Styrene	100-42-5	5 - 35%	OSHA - 50 ppm PEL 100 ppm STEL ACGIH - 50 ppm TLV 100 ppm STEL NIOSH - 50 ppm TLV 100 ppm STEL

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point:	N.A.	Specific Gravity (H2O=1):	1.6 - 2.2
Vapor Pressure @ 70F:	N.A.	% Volatiles by Volume:	N.A.
Vapor Density (Air=1):	N.A.	Evaporation Rate:	N.A.
Solubility in Water:	Insoluble		
pH:	Unknown		

Appearance and Odor: Various colors in flat sheets, corregated sheets, structurals, and molded pieces.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable

Flammable Limits: Not Applicable

Extinguishing Media: Use methods applicable to surrounding area.

Special Fire Fighting Procedures: Use self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: Dusts generated from grinding, sanding, and cutting may be explosive if ignition source is present.

SECTION V - REACTIVITY DATA

Stable: Yes

Conditions to Avoid: None known

Incompatability (Materials to Avoid): Not Applicable

Hazardous Decomposition or Byproducts: Carbon Monoxide, Hydrogen Bromide, Styrene

Hazardous Polymerization: Will Not Occur

Conditions to Avoid: Not Applicable

SECTION VI - HEALTH HAZARD DATA

The following data pertains to dusts only.

Inhalation:
Irretation or soreness in throat and nose. In extreme exposure some congestion may occur.

Skin and Eye:
Skin contact can cause temporary irritation or rash. Eye contact can cause temporary irritation or inflammation.

INCOMPABILITY (MATERIALS TO AVOID): Sodium Chlorate can react violently with strong acids, organic substances, sulfur and sulfides, powdered metals. phosphorous, ammonium compounds, decomposed by high temperatures.

HAZARDOUS DECOMPOSITION PRODUCTS: Oxygen and possible unstable chlorine dioxide which decomposes spontaneously to Chlorine.

HAZARDOUS POLYMERIZATION ( ) May Occur (X) Will Not Occur

SECTION IX - ENVIRONMENTAL PROTECTION DATA

ENVIRONMENTAL PRECAUTIONS: Toxic to fish. Low toxicity to wild life.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up or vacuum in a dry state on wood floors. Sweep up or vacuum, then flush with water on concrete or metal floors. Remove contaminated clothing at once and wash before using.

WASTE DISPOSAL PROCEDURES: Make a slurry using water and blend with bisulfites or Ferrous salts and sulfuric acid. Neutralize with soda or muriatic acid. Bury in state approved toxic waste disposal landfill site.

SECTION X - HANDLING AND STORAGE PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in cool, dry, fire resistant area; separate from acid, solvents, oils, organic substances, sulfur, sulfides, powdered metals, ammonium salts, etc. and away from fire hazards. Do not store on wood floors.

PROPER SHIPPING NAME: Not regulated by D.O.T.

HAZARD CLASS: None

LABEL(S) REQUIRED (IF NOT EXEMPTED): None required

( ) FLAMMABLE ( ) OXIDIZER ( ) CORROSIVE ( ) POISON

SECTION VI - PERSONAL PROTECTION DATA

VENTILATION: General room ventilation plus special exhaust at points of dust emission. Systems should discharge through a water scrubber.

RESPITATORY PROTECTION: Dust mask where appropriate.

PROTECTIVE CLOTHING: Washable head covering, cotton coveralls laundered daily: rubber gloves and rubber footwear.

EYE PROTECTION: Chemical safety glasses.

OTHER: Safety shower and eye wash fountain.

SECTION VII - FIRE AND EXPLOTION HAZARD DATA

FLASH POINT (TEST METHOD): None

AUTOIGNITION TEMPERATURE: Not Cumbustible

FLAMMABLE LIMITS (% BY VOLUME): N/A

EXTINGISHING MEDIA: Flood with water. Sodium Chlorate decomposes at 570 F and supplies its own oxygen, hence smothering type fire extinguishing agents not effective.

SPECIAL FIRE FIGHTING PROCEDURES: Approach upwind from fire. Evacuate people downwind from fire. Wear self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Sodium Metaborate is a fire retardant. Sodium Chlorate is a strong oxidizing agent and is an extreme fire & explosion hazard when in contact with organics, acid paper, oil, or solvents.

SECTION VIII - REACTIVITY DATA

CONDITIONS TO AVOID: Heat, uncontrolled contact with strong acids, organics, chemicals, phosphorous, sulfur, sulfides, powdered metals, ammonium compounds, organic matter, carbon, etc.

STABILITY (NORMAL CONDITIONS) STABLE (X) UNSTABLE ( )

SECTION IV - PHYSICAL PROPERTIES

BOILING POINT:	N/A	% VOLATILES (BY VOLUME):	0
DENSITY:	54 lbs/ft	VAPOR PRESSURE, mm Hg:	N/A
APPEARANCE:	Off white,odorless granular solids		
FLASH POINT:	N/A		
REACTION WITH WATER:	None		
EXTINGUISHING MEDIA:	Flood with water		
SOLUBILITY IN WATER:	> 2 lbs/gal @ 68 F		

SECTION V - HEALTH HAZARD DATA

INGESTION: Acute oral LD (rats) 2330-3500 mg/Kg. Farm Chemicals Handbook, 1980.

INHALATION: Irritation of mucous membranes and possible ulceration of nasal septum.

SKIN ABSORPTION: No information on dermal toxicity available.

SKIN CONTACT: Moderate skin irritant.

EYE CONTACT: Moderate eye irritant.

EFFECTS OF OVERDOSE: Dust may irritate eyes, skin and mucous membranes. Ingestion of large quantities might prove fatal with symptoms of gastritis. Abdominal pains, nausea, diarrhea, vomiting, cyanosis and collapse. May cause methemoglobinemia and a late toxic nephritis.

EMERGENCY AND FIRST AID PROCEDURES:

EYES - Flush with stream of water for 15 minutes and get medical attention.

SKIN - Wash with large quantities of soap and water.

INGESTION - Dilute by drinking soapy water to induce vomiting. Get medical attention. Gastric lavage followed by saline cathorsis. Test for methemoglobinemia and treat. Hemodiolysis is recommemnded for removal of chlorates.

GARON PRODUCTS, INC. 1924 HIGHWAY 35 WALL, NJ 07719 201-449-1776

MATERIAL SAFETY DATA SHEET

DATE: 6/86

SECTION I - IDENTIFICA

MANUFACTURER'S NAME:

GARON PRODUCTS, INC.
1924 HIGHWAY 35 CN20
WALL, NJ 07719

PRODUCT NAME: WEED-X

COMMON NAME: Monobor Chlorate + Diuron

CHEMICAL TYPE: Herbicide

SECTION II - SHIPPING DATA

SHIPPING NAME: Not regulated by D.O.T.

HAZARD CLASS: None

REPORTABLE QUANTITY (RQ): 8000 lbs. (Diuron)

LABELS REQUIRED: None

C.A.S. NUMBER: 7775-09-1 & 7775-19-1

PLACARD: None

HAZARDOUS WASTE NO.: None

D.O.T. NUMBER: None

E.P.A. REGISTRATION NO.: 7001-337-44584

SECTION III - HAZARDOUS INGREDIENTS

CHEMICAL NAME AND SYNONYMS:	CHEMICAL FORMULA	WT%	TLV	LD50
Sodium Chlorate	$NACl0_3$	30	NE	2330-3500
Sodium Metaborate Tetrahydrate	$NA_2B_2O_4.4H_2O$	66.5		
Diuron 3-(3,4- dichlorophenyO-1,1-dimethylurea	$C_9H_{10}Cl_2N_2O_2$	1.25		

GRADE	SPECIFIC GRAVITY	MELTING POINT °F	FLASH IGNITION TEMP. °F	HAZARDOUS PRODUCTS OF COMBUSTION
THERMOSETS				
Resin Reinforcement				
Epoxy Glass	1.65 - 2.20	DNM*	Non-Volatile	Carbon Monoxide - Formaldehyde-Hydrogen Bromide
Polyester Glass	1.55 - 2.00	DNM	650	Carbon Monoxide
Vinyl Ester Glass	1.52 - 1.95	DNM	650	Carbon Monoxide
Polyester FR Glass	1.55 - 2.00	DNM	650	Carbon Monoxide - Hydrogen Bromide
Vinyl Ester FR Glass	1.52 - 1.95	DNM	650	Carbon Monoxide - Hydrogen Bromide

* = DOES NOT MELT

Emergency and First Aid Procedures: In the event of acute exposure, remove to fresh air, administer oxygen, and seek a physician's assistance.

VI. REACTIVITY DATA

Stability: Considered Stable
Incompatibility: Not incompatible with materials.
Hazardous Polymerization: Not Applicable
Hazardous Decomposition Products: See Chart
Conditions to Avoid: When heated to decomposition or composition temperatures products of decomposition include carbon dioxide, carbon monoxide and other volatiles as indicated.

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled: Not Applicable

Waste Disposal Method: Approved method of solid waste disposal.

VIII. SPECIAL PROTECTION INFORMATION

When machining thermosetting plastic dry, a dusty condition may result. A suitable dust collection system should be employed along with a dust mask for respiratory protection. A protective cream or clothing should be used to protect skin for worker comfort. When machining any plastics, safety glasses or a face shield should be used.

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing: Not Applicable
Other Precautions: When fighting fires where plastics are burning a self contained breathing apparatus (SCBA) must be used.

Date Prepared: February 24, 1987
Issued by: Composite Technology, Inc.

owr 8/1/91

COMPOSITE TECHNOLOGY, INC.

MATERIAL SAFETY DATA SHEET
PLASTICS

I. PRODUCT IDENTIFICATION

Distributor: Composite Technology, Inc.
Address: 1005 Blue Mound Road
Fort Worth, Texas 76131
Emergency Telephone: 817-232-1127
Chemical Name and Synonyms: Plastics
Chemical Family: Plastics
Formula: Mixture

II. PRODUCT DESCRIPTION AND HAZARDOUS INGREDIENTS/IDENTITY INFORMATION:

See Chart Inside

III. PHYSICAL DATA

Melting Point F (C): See Chart
Vapor Pressure: Not Applicable
Vapor Density (Air = 1): Not Applicable
Solubility in Water: Negligible
Appearance and Odor: Various colors from white to black, in sheet, plate, bar, structurals or tubing.
Specific Gravity(H_2O = 1): See Chart
% Volatile by Volume (%): Not Applicable
Evaporation Rate: Not Applicable

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point F(C): Not Applicable
Extinguishing Media: Use Methods applicable to surrounding area.
Special Fire Fighting Procedures: Use self-contained breathing apparatus for protection against degradation products from surroundings materials.
Flammable Limits: Not Applicable
Unusual Fire and Explosion Hazards: None

V. HEALTH HAZARD DATA

Applicable Statutory of Recommended Occupational Exposure Limits: See Section II - Hazardous Ingredients. No TLV exits for plastic products, the hazards associated with plastic are for the individual constituents.

NE = NONE ESTABLISHED	REC	=	RECOMMENDED
ND = NONE DETERMINED	V	=	RECOMM. BY VENDOR
BY-PRODUCT = REACTION BY-	SKN	=	SKIN
PRODUCT, TSCA INVENTORY	TS	=	TRADE SECRET
STATUS NOT REQUIRED UNDER	R	=	RECOMMENDED
40 CFR PART 720.30(H-2)	MST	=	MIST

EXHAUST VENTILATION
EYEWASH STATIONS.
USE IN A WELL VENTILATED AREA.
LOCALIZED VENTILATION SHOULD BE USED TO CONTROL DUST LEVELS.

*** X SHIPPING AND REGULATORY CLASSIFICATION DATA ***

DOT SHIPPING NAME: NONE
DOT HAZARD CLASS: NONE
DOT LABELS(S): NONE
UN/NA NUMBER: NONE
PLACARDS:
NONE
EXPORT:
NA

EPA HAZARD WASTE: NA
SARA HAZARD CLASS:
TO BE DETERMINED
WHMIS HAZARD CLASS:
D2B TOXIC MATERIALS
CEC CLASSIFICATION: NA
TRANSPORTATION CLASS: NA
RID (OCTI) NA
ADR (ECE) NA
RAR (IATA) NA
NFPA/HMIS CLASSIFICATION FLAMMABILITY 0 , REACTIVITY 0 , HEALTH 2

SCHEDULE B:
ECCN:

ADDITIONAL INFORMATION:
THIS PRODUCT OR ITS COMPONENTS ARE ON THE EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICALS (EINECS).....
.....
THESE DATA ARE OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT AS A PRODUCT SPECIFICATION. NO WARRANTY, EITHER EXPRESSED OR IMPLIED, IS MADE. THE RECOMMENDED HANDLING PROCEDURES ARE BELIEVED TO BE GENERALLY APPLICABLE. HOWEVER, EACH USER SHOULD REVIEW THESE RECOMMENDATIONS IN THE SPECIFIC CONTENT OF THE INTENDED USE.....
.....

C =	CEILING LIMIT	NEGL =	NEGLIGIBLE
EST=	ESTIMATED	NF =	NONE FOUND
NA =	NOT APPLICABLE	UNKN =	UNKNOWN

THIS PRODUCT OR ONE OF ITS INGREDIENTS PRESENT 0.1% OR MORE
IS NOT LISTED AS A CARCINOGEN OR SUSPECTED CARCINOGEN BY
NTP, IARC, OR OSHA
PRODUCTS/INGREDIENTS
THIS SPACE RESERVED FOR SPECIAL USE.

PREVENTATIVE MEASURES (SECTIONS VII, VIII, IX)

*** VII SPECIAL PROTECTIVE EQUIPMENT ***

RESPIRATORY PROTECTION:
USE IN A WELL VENTILATED AREA.
PROTECTIVE GLOVES:
CLOTH GLOVES.
EYE AND FACE PROTECTION:
SAFETY GLASSES.
OTHER PROTECTIVE EQUIPMENT:
NONE KNOWN.
VENTILATION:
USE ONLY IN WELL VENTILATED AREA.

*** VIII SPILL, LEAK AND DISPOSAL PROCEDURES ***

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
WIPE, SCRAPE OR SOAK UP IN AN INERT MATERIAL AND PUT IN A CONTAINER FOR DISPOSAL.
WASH WALKING SURFACES WITH DETERGENT AND WATER TO REDUCE SLIPPING HAZARD.
WEAR PROPER PROTECTIVE EQUIPMENT AS SPECIFIED IN THE PROTECTIVE EQUIPMENT SECTION.
INCREASE AREA VENTILATION.
DISPOSAL METHOD:
DISPOSAL SHOULD BE MADE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

*** IX SPECIAL PRECAUTIONS ***

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
KEEP CONTAINER CLOSED WHEN NOT IN USE.
AVOID CONTACT WITH SKIN AND EYES.
USE ONLY IN A WELL VENTILATED AREA.
REMOVE CONTACT LENSES BEFORE USING SEALANT. DO NOT HANDLE LENSES UNTIL ALL SEALANT HAS BEEN CLEANED FROM THE FINGERTIPS, NAILS AND CUTICLES. RESIDUAL SEALANT MAY REMAIN ON FINGERS FOR SEVERAL DAYS AND TRANSFER TO LENSES AND CAUSE SEVERE EYE IRRITATION.
PRODUCT RELEASES ACETIC ACID DURING APPLICATION AND CURING.
USE MECHANICAL VENTILATION TO STAY BELOW TLV OF 10 PPM ACETIC ACID.
ENGINEERING CONTROLS:

*** VI HEALTH HAZARD DATA ***

ACUTE SIGNS/EFFECTS OF OVEREXPOSURE:
INGESTION:
NONE KNOWN
SKIN CONTACT:
UNCURED PRODUCT CONTACT WILL IRRITATE LIPS,GUMS AND TONGUE.
UNCURED PRODUCT CONTACT MAY IRRITATE THE SKIN.
INHALATION:
CAUSES MILD RESPIRATORY IRRITATION.
HARMFUL IF INHALED.
APPLIES ONLY IN UNCURED STATE.
EYE CONTACT:
UNCURED PRODUCT CONTACT IRRITATES EYES.
MEDICAL CONDITIONS AGGRAVATED:
NONE KNOWN.
RESPIRATORY
OTHER:
ACETIC ACID RELEASED DURING CURING.
CHRONIC EFFECTS OF OVEREXPOSURE:
NONE KNOWN.

EMERGENCY AND FIRST AID PROCEDURES:
INGESTION:
RINSE MOUTH WITH WATER SEVERAL TIMES.
SKIN:
TO CLEAN FROM SKIN, REMOVE COMPLETELY WITH A DRY CLOTH OR PAPER TOWEL, BEFORE WASHING WITH DETERGENT AND WATER.
INHALATION:
MOVE PERSON TO FRESH AIR.
EYES:
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND GET MEDICAL ATTENTION.
NOTE TO PHYSICIAN:
NONE KNOWN.

TOXICITY:	METHYLTRIACETOXYSILANE	
ACUTE ORAL LD50:	2060 (RAT)	MG/KG
ACUTE DERMAL LD50:	UNKNOWN	MG/KG
ACUTE INHALATION LC50:	UNKNOWN	
OTHER: NONE.		

AMES TEST: UNKNOWN
PRINCIPALS ROUTES OF EXPOSURE:
DERMAL - SKIN.
INHALATION.

*** III PHYSICAL DATA ***

**PRODUCT INFORMATION

BOILING POINT	: NA (F) NA (C)	% VOLATILE BY VOLUME	:<5
VAPOR PRESSURE(20 C)	: NA MM HG	EVAPORATION RATE (BUTYL ACETATE=1)	:NEG.
VAPOR DENSITY(AIR=1)	: NA		
FREEZING POINT	: NA (F) NA (C)	SPECIFIC GRAVITY (WATER=1)	:1.04
MELTING POINT	: NA (F) NA (C)		
PHYSICAL STATE	: SOLID	DENSITY	:1042.5 KG/M3
ODOR	: ACETIC ACID	ACID/ALKALINITY	:UNKNOWN MEG/G
COLOR	: CLEAR	PH	:NA
ODOR THRESHOLD	: 1.0 (PPM)		

SOLUBILITY IN WATER(20C): INSOLUBLE
SOLUBILITY IN ORGANIC SOLVENT: SLIGHTLY SOLUBLE, AROMATIC (STATE SOLVENT)

METHYLTRIACETOXYSILANE

BOILING POINT	: 240 (F) 115.5(C)
VAPOR PRESSURE(20 C)	: UNKN MM HG
VAPOR DENSITY(AIR=1)	: 2

*** IV FIRE AND EXPLOSITION DATA ***

F SH PT: NA (F) NA (C) BY NA IGNITION TEMP: NA (F) NA (C)
FLAMMABLE LIMITS IN AIR(%): LOWER NA UPPER NA
SENSITIVITY TO MECHANICAL IMPACT (Y/N): N
SENSITIVITY TO STATIC DISCHARGE:
SENSITIVITY TO STATIC DISCHARGE IS NOT EXPECTED.
EXTINGUISHING MEDIA:
ALL STANDARD FIREFIGHTING MEDIA
SPECIAL FIREFIGHTING PROCEDURES:
NONE KNOWN.

*** V REACTIVITY DATA ***

STABILITY: HAZARDOUS:
X STABLE UNSTABLE POLYMERIZATION WILL NOT OCCUR
HAZARDOUS DECOMPOSITION/COMBUSTION PRODUCTS:
SILICON DIOXIDE.
ACETIC ACID.
INCOMPATIBILITY (MATERIALS TO AVOID):
CONTACT WITH OXIDIZING AGENTS.
APPLIES IN UNCURED STATE.
CONDITIONS TO AVOID:
NONE KNOWN.

MATERIAL SAFETY DATA SH
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MANUFACTURED BY:

GENERAL ELECTRIC CO.
SILICONE PRODUCTS DIV
WATERFORD, NY 12188

EMERGENCY TELEPHONE:

(518) 237-3330 (24 HRS)

SUPPLIED BY:

GENERAL ELECTRIC CO.
SILICONE PRODUCTS DIV
WATERFORD, NY 12188

(518) 237-3330 (24 HRS)

REVISED: 07/15/88
PREPARER: DA POLSINELLI

*** I PRODUCT IDENTIFICATION ***

PRODUCT IDENTIFICATION: IS808
CHEMICAL FAMILY
SILICONE RUBBER SEALANT
CHEMICAL NAME: SILICONE INDUSTRIAL SEALANT FORMULA: MIXTURE

*** II PRODUCT COMPONENTS ***

PRODUCT COMPOSITION	APPROX. WGT. %	ACGIH TLV	OSHA PEL	UNITS	CAS REG NO.
A. HAZARDOUS					
METHYLTRIACETOXYSILANE	1-5	10(R)	10(R)	PPM	4253-34-3*
B. NON-HAZARDOUS					

FORMULATION INFORMATION:
THIS SPACE RESERVED FOR SPECIAL USE.

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
N/A		

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SECTION XII - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS | ID NUMBER | REPORT QTY

LABELS | LIMITED QTY

UNIT CONTAINER

DOT SPS CONTAINER | NET EXPLOSIVE WT.

AEROSOL PROPELLANT(S)

SECTION XIII - REFERENCES

MANUFACTURER'S MATERIAL SAFETY DATA SHEET.
* INGREDIENT PERCENTAGE IS A TRADE SECRET;
MASS. TRADE SECRET NUMBER 99-127-001.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE IN LIGHT OF CURRENT FORMULATION, HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THIS DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH ASSUMES NO RESPONSIBILITY FOR PERSONAL INJURY OR PROPERTY DAMAGE CAUSED BY THE USE , STORAGE OR DISPOSAL OF THE PRODUCT IN A MANNER NOT RECOMMENDED ON THE PRODUCT LABEL. USERS ASSUME ALL RISKS ASSOCIATED WITH SUCH UNRECOMMENDED USE, STORAGE, OR DISPOSAL OF THE PRODUCT.

MATERIAL SAFETY DATA SHEET : GAPPER ADHESIVE PAGE : 01

(023828-0271@ -40135925-67004920) | DATE OF ISSUE 04/24/89 | SUPERSEDES 03/22/89

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS
ALFA CYANOACRYLATE

TRADE NAME & SYNONYMS
GAPPER ADHESIVE

CHEMICAL FAMILY
CYANOACRYLATE

FORMULA
X<--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:
MIKE COLE/T.S.CHEMIST

PRODUCT CODE NUMBER
67004920

EMERGENCY TELEPHONE NUMBER
214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV*	PEL*	CAS#
ETHYL CYANOACRYLATE	IRRITANT	2PPM	N/A	7085-85-0
POLY METHLY METHACRYLATE *	IRRITANT	N/A	N/A	9011-14-7

* SEE SECTION XII

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	149 F	SPEC GRAVITY (H2O=1)	:1.07@ 80 F

GAPPER ADHESIVE

(CONTINUED) SECTION III - PHYSICAL DATA PAGE : 02

VAPOR PRESSURE (MM HG).	20 C	COLOR	TRANSPARENT
VAPOR DENSITY (AIR=1)	20 C	ODOR	STIMULATIVE SMELL
PH @ 100%	N/A	CLARITY	N/A
PERCENT, VOLATILE BY VOLUME (%)	N/A	EVAPORATION RATE (BU AC = 1)	N/A
SOLUBILITY IN WATER	INSOLUBLE		
VISCOSITY	N/A		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
176 F T.C.C.		N/A	N/A

EXTINGUISHING MEDIA
X<--FOAM "ALCOHOL" <--FOAM X<--CO2 DRY X<--CHEMICAL WATER X<--SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
AS WITH ALL FIRES INVOVLING CHEMICALS, WEAR SCBA AND FULL PROTECTIVE GEAR.

UNUSUAL FIRE & EXPLOSION HAZARDS
N/A

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
3 <--HEALTH 2 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

2PPM

EFFECTS OF OVEREXPOSURE

- ACUTE - (SHORT TERM EXPOSURE)

THE ADHESIVE BONDS SKIN RAPIDLY AND STRONGLY, IRRITATES EYES AND MUCOUS MEM BRANES.

- CHRONIC - (LONG TERM EXPOSURE)

THE ADHESIVE BONDS SKIN RAPIDLY AND STRONGLY, IRRITATES EYES AND MUCOUS

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-027
8/1/91

MEMBRANES.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION <-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES
INHALATION :
REMOVE TO FRESH AIR. SEEK MEDICAL ATTENTION.

EYE CONTACT:
FLUSH WITH COPIUS AMOUNTS OF WATER. OBTAIN MEDICAL ATTENTION.

SKIN CONTACT:
ADHESIVE BONDS SKIN RAPIDLY AND STRONGLY.
WASH WITH SOAP AND WATER.

INGESTION :
INDUCE VOMITING. SEEK MEDICAL ATTENTION.

NOTES TO PHYSICIAN :
N/A

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

N/A

SECTION VII - REACTIVITY DATA

	<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
STABILITY			UNSTABLE OVER 176 F. STABLE UP TO 122 F.

INCOMPATIBILITY (MATERIALS TO AVOID)
POLYMERIZED BY WATER, ALCOHOLS, AMINES, AND ALKALINE SUBSTANCE.

HAZARDOUS DECOMPOSITION PRODUCTS
TOXIC CYANIDES

	WILL NOT	MAY	CONDITIONS TO AVOID
HAZARDOUS	X <--OCCUR	<--OCCUR	
POLYMERIZATION			STORE IN COOL DRY AREA - AVOID BASIC CONTACT.

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
ABSORB WITH TISSUES. FLOOD WITH WATER TO POLYMERIZE. POLYMERIZED PRO-
DUCT MAY BE DISPOSED OF AS A SOLID CHEMICAL WASTE.

WASTE DISPOSAL METHOD
AS A CHEMICAL WASTE.

NEUTRALIZING AGENT
N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
LOCAL EXHAUST NOT NECESSARY.
MECHANICAL (GENERAL) SEALED WATER SCRUBBER.

RESPIRATORY PROTECTION
NOT NECESSARY.

PROTECTIVE GLOVES
RUBBER OR VINYL GLOVES.

EYE PROTECTION
SAFETY GLASSES WITH SHIELD.

OTHER PROTECTION
N/A

SECTION X - STORAGE AND HANDLING INFORMATION

STORAGE TEMPERATURE OOOOOO<--MAX OOOOOO<--MIN	INDOOR	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
AVOID CONTACT WITH SKIN, EYES, OR MOISTURE. AVOID
PROLONG BREATHING OF VAPORS.

OTHER PRECAUTIONS
STORE BELOW 24 C (75 F). KEEP CONTAINER SEALED TI
GHT AND OUT OF DIRECT SUNLIGHT.

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
ACETONITRILE	75-05-8	10

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SECTION XII - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS

<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS | ID NUMBER | REPORT QTY

LABELS | LIMITED QTY

UNIT CONTAINER

DOT SPS CONTAINER | NET EXPLOSIVE WT.

AEROSOL PROPELLANT(S)

SECTION XIII - REFERENCES

1. THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES, 1987-1988.
2. DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS, 6TH EDITION
N. IRIVNG SAX.

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(023828-0271@ -40135925-67004921)	DATE OF ISSUE 12/15/88	SUPERSEDES 11/11/87

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS	TRADE NAME & SYNONYMS
N/A	DYNA DEBONDER
CHEMICAL FAMILY	**FORMULA**
N/A	X<--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
RICHARD STOLLEY/T.S.CHEM.	67004921	214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV*	PEL*	CAS#
ACETONITRILE(SKIN ABSORBTION)	**	40PPM 1.	70MG/M3 1.	75-05-8

**FLAM/TOX/IRR

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	170 F	SPEC GRAVITY (H2O=1)	:0.859
VAPOR PRESSURE (MM HG).	N/A	COLOR	COLORLESS TO PINK

VAPOR DENSITY (AIR=1)	1.41	ODOR	ETHEREAL ODOR
PH @ 100%	N/A	CLARITY	N/A
PERCENT, VOLATILE BY VOLUME (%)	N/A	EVAPORATION RATE (BU AC = 1)	N/A
SOLUBILITY IN WATER	100%		
VISCOSITY	NON-VISCOUS		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
45 F T.C.C.		N/A	N/A

EXTINGUISHING MEDIA "ALCOHOL"
X<--FOAM <--FOAM X<--CO2 DRY <--CHEMICAL WATER <--SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
THE BEST EXTINGUISHING AGENT IS A MECHANICAL FOAM OF THE ALCOHOL TYPE. WATER SHOULD BE USED TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
WEAR SELF-CONTAINED BREATHING APPARATUS, WEAR GOGGLES IF EYE PROTECTION IS NOT PROVIDED.

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
2 <--HEALTH 3 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

NOT ESTABLISHED FOR MIXTURE. SEE SECTION II.

EFFECTS OF OVEREXPOSURE

- ACUTE - (SHORT TERM EXPOSURE)

HIGH CONCENTRATION CAN CAUSE SYMPTOMS OF WEAKNESS, FLUSHING OF THE FACE AND SOME TEMPORARY BRONCHIAL TIGHTNESS.

- CHRONIC - (LONG TERM EXPOSURE)

HIGH CONCENTRATION CAN CAUSE SYMPTOMS OF WEAKNESS, FLUSHING OF THE FACE AND SOME TEMPORARY BRONCHIAL TIGHTNESS.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION <-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :

REMOVE TO UNCONTAMINATED ATMOSPHERE. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION.

EYE CONTACT:

FLUSH WITH WATER FOR 15 MINUTES, HOLDING EYELIDS APART OCCASIONALLY. SEE PHYSICIAN IF IRRITATION PERSISTS.

SKIN CONTACT:

FLUSH WITH WATER.

INGESTION :

DO NOT INDUCE VOMITING.

NOTES TO PHYSICIAN :

N/A

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

ACETONITRILE
ORL-HMN TDLO: 570MG/KG CNS 2.
SKN-RBT 500MG OPEN MILD 2.
ORL-RAT LD50: 3800MG/KG 2.

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
STABILITY			CONTACT WITH STRONG ACIDS.

INCOMPATIBILITY (MATERIALS TO AVOID)
PERCHLORATES, STRONG ACIDS, SULFURIC ACID, CHLOROSULFONIC ACID.

HAZARDOUS DECOMPOSITION PRODUCTS
CYNANIDES UPON THERMAL DECOMPOSITION, OXIDES OF NITROGEN

	WILL NOT	MAY	CONDITIONS TO AVOID
HAZARDOUS POLYMERIZATION	X <--OCCUR	<--OCCUR	

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
CONTAINMENT, IF POSSIBLE, BY BUILDING TEMPORARY DIKES WITH DIRT AND BY REMOVING FOR POLLUTION CONTROL.

WASTE DISPOSAL METHOD
COMPLY WITH STATE AND FEDERAL LAWS. CAN BE DESTROYED BY BIOTREATMENT IN POND; CAN BE TURNED; CAN BE DESTROYED BY ALKALINE CHLORINATION AND BY OZONE; CAN BE DESTROYED BY BURNING.

NEUTRALIZING AGENT

N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
GENERAL EXHAUST IS MORE THAN ADEQUATE TO PROTECT WORKER FROM EXPOSURE TO LEVELS ABOVE PERMISSIBLE EXPOSURE LIMITS.

RESPIRATORY PROTECTION
IN NON-VENTILATED AREA USE AIR PAK OR SIMILAR BREATHING AIR EQUIPMENT.

PROTECTIVE GLOVES
NEOPRENE GLOVES SHOULD BE WORN DEPENDING ON SEVERI
TY OF EXPOSURE.

EYE PROTECTION
SAFETY GOGGLES SHOULD BE WORN DEPENDING ON SEVERIT
Y OF EXPOSURE.

OTHER PROTECTION
N/A

SECTION X - STORAGE AND HANDLING INFORMATION

STORAGE TEMPERATURE 000000<--MAX 000000<--MIN	INDOOR	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
AVOID HIGH CONCENTRATIONS OF VAPORS. STORE AT AMBIENT TEMPERATURES. AVOID GROSS CONTAMINATION O
F SKIN. WASH OFF SKIN WITH SOAP AND WATER.

OTHER PRECAUTIONS
N/A

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
N/A		

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SECTION XII - TRANSPORTATION * (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS	ID NUMBER	REPORT QTY
LABELS	LIMITED QTY	
UNIT CONTAINER		
DOT SPS CONTAINER	NET EXPLOSIVE WT.	
AEROSOL PROPELLANT(S)		

SECTION XIII - REFERENCES

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MATERIAL SAFETY DATA SHEET : TRUST-X ACCELORATOR PAGE : 01

(023828-0271● -40135925-67051000) | DATE OF ISSUE 08/15/89 | SUPERSEDES 11/11/87

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS
N/A

TRADE NAME & SYNONYMS
TRUST-X ACCELORATOR

CHEMICAL FAMILY
N/A

FORMULA
X<--MIXTURE

MANUFACTURERS NAME:
DYNA SYSTEMS A PARTSMASTER CO DIV OF NCH

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
P.O. BOX 655326
DALLAS, TEXAS 75265-5326

PREPARED BY:
MIKE COLE/T.S.CHEMIST

PRODUCT CODE NUMBER
67051000

EMERGENCY TELEPHONE NUMBER
214-438-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS AS THE PRODUCT MIXTURE HAS NOT BEEN TESTED AS A WHOLE.

CHEMICAL NAME (INGREDIENTS)	HAZARD	TLV*	PEL*	CAS#
TRICHLOROTRIFLOUROETHANE	ANESTHETIC	1000PPM	1000PPM	76-13-1
ALKYL ARYL AMINE	IRRITANT	5 PPM	N/A	N/A

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	117.6	SPEC GRAVITY (H2O=1)	:1.40
VAPOR PRESSURE (MM HG).	334	COLOR	WHITE TO STRAW

TRUST-X ACCELORATOR

(CONTINUED) SECTION III - PHYSICAL DATA PAGE : 02

VAPOR DENSITY (AIR=1)	2.9	ODOR	SLIGHT ODOR
PH @ 100%	N/A	CLARITY	WATERY LIQUID
PERCENT, VOLATILE BY VOLUME (%)	100	EVAPORATION RATE (BU AC = 1)	N/A
SOLUBILITY IN WATER	.02G/100@25C		
VISCOSITY	N/A		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
> 200 F.TCC	N/A	N/A	N/A

EXTINGUISHING MEDIA
X<--FOAM "ALCOHOL" <--FOAM X<--CO2 DRY X<--CHEMICAL WATER X<--SPRAY X<--OTHER

SPECIAL FIRE FIGHTING PROCEDURES

SELF-CONTAINED RESPIRATORY EQUIPMENT.

UNUSUAL FIRE & EXPLOSION HAZARDS

N/A

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
3 <--HEALTH 2 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE :

965 PPM

EFFECTS OF OVEREXPOSURE

- ACUTE - (SHORT TERM EXPOSURE)

LIGHT HEADEDNESS, GIDDINESS, SHORTNESS OF BREATH, POSSIBLE NARCOSIS POSSIBLE CARDIAC ARRHYTHMIAS AT HIGH CONCENTRATIONS.

- CHRONIC - (LONG TERM EXPOSURE)

LIGHT HEADEDNESS, GIDDINESS, SHORTNESS OF BREATH, POSSIBLE NARCOSIS POSSIBLE CARDIAC ARRHYTHMIAS AT HIGH CONCENTRATIONS.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION <-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :

REMOVE TO FRESH AIR, CALL A PHYSICIAN. DO NOT GIVE EPINEPHRINE OR SIMILAR DRUGS.

EYE CONTACT:

FLUSH WITH WATER.

SKIN CONTACT:

FLUSH WITH WATER.

INGESTION :

N/A

NOTES TO PHYSICIAN :

N/A

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO	<--YES X<--NO

N/A

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL	CONDIDTIONS TO AVOID
STABILITY			OPEN FLAMES OR HIGH TEMPERATURES.

INCOMPATIBILITY (MATERIALS TO AVOID)

ALKALI OR ALKALINE EARTH METALS--PWD. AL, ZINC, BERYLLIUM, ETC.

HAZARDOUS DECOMPOSITION PRODUCTS

HYDROCHLORIC ACID, HYDROFLOURIC ACID AND POSSIBLE PHOSGENE.

	WILL NOT	MAY	CONDITIONS TO AVOID
HAZARDOUS POLYMERIZATION	X <--OCCUR	<--OCCUR	

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
VENTILATE AREA - ESPECIALLY LOW PLACES WHERE HEAVY VAPORS MIGHT COLLECT.
REMOVE OPEN FLAMES.

WASTE DISPOSAL METHOD
EVAPORATE OUTDOORS.

NEUTRALIZING AGENT
N/A

SECTION IX - SPECIAL PROTECTION INFORMATION

REQUIRED VENTILATION
LOCAL EXHAUST WHEN LARGE AMOUNTS ARE RELEASED.
MECHANICAL(GENERAL) ESPECIALLY LOW PLACES.

RESPIRATORY PROTECTION
USE AIR MASK AT HIGH CONCENTRATIONS.

PROTECTIVE GLOVES
WHEN HANDLING LIQUID

EYE PROTECTION
SAFETY GLASSES

OTHER PROTECTION
N/A

SECTION X - STORAGE AND HANDLING INFORMATION

STORAGE TEMPERATURE OOOOOO<--MAX OOOOOO<--MIN	INDOOR	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
AVOID BREATHING VAPORS: HANDLE WITH REASONABLE CARE. STORE CONTAINERS IN CLEAN DRY AREA. DO NOT HEAT ABOVE 125 F.

OTHER PRECAUTIONS
N/A

Flammable Limits

Refers to the range of gas or vapor concentration (percent by volume in air) which will burn or explode if an ignition source is present. Lower means the lower flammable limit and upper means the upper flammable limit given in percent.

Products Evolved When Subjected to Heat or Combustion.

The products evolved when this material is subjected to heat or combustion. Includes temperature at which oxidation or other forms of degradation occurs.

Recommended Fire Extinguishing Agents and Special Procedures

Specifies the fire fighting agents that should be used to extinguish fires. If unusual fire hazards are involved or special procedures indicated, this is specified.

Unsusual Fire or Explosive Hazards

Specifies hazards to personnel in case of fire, explosive danger.

ENVIRONMENTAL PROTECTION

Specifies how this product may be disposed.

Indicates precautions necessary in the event that leakage or breakage occurs. Included are (a) clean-up procedures, (b) personal protective equipment if necessary, (c) hazards that may be created, i.e. fire explosion, etc.

PRECAUTIONS

Label that is required or recommended.

Requirements for Transportation, Handling and Storage

Specifies handling and storage procedures. Gives ICC, DOT, or other regulations related to safety and health for transportation.

CHEMICAL AND PHYSICAL PROPERTIES

Boiling Point (or Range)

In degrees Fahrenheit or Celsius Boiling Point at 760 mmHg.

Vapor Pressure

Pressure exerted when a solid or liquid is in equilibrium with its own vapor.

Specific Gravity

The ratio of the density of the product to the density of water.

Vapor Density

The ratio of the density of the vapor at saturation concentration (20 degrees Celsius or 68 degrees Fahrenheit) to the density of air at 760 mmHg.

Appearance and Odor

Refers to the general characterization of the material, e.g. powder, colorless liquid, aromatic odor, etc.

pH

Refers to the degree of acidity or basicity of the material in a specific concentration.

pH1-5 - STRONGLY ACIDIC
pH5-7 - WEAKLY ACIDIC
pH7-9 - WEAKLY BASIC
pH9-14 - STRONGLY BASIC

Solubility

Refers to the solubility of a material by weight in water at room temperature. The term negligible, less than 0.1 %; slight, 0.1 to 1%; moderate, 1 to 10%; appreciable, 10% or greater. Gives solubility in organic solvents where appropriate.

Percent Volatile By Volume

Refers to the amount volatilized at 20 degrees Celsius or 68 degrees Fahrenheit when allowed to evaporate.

Evaporation

Gives the rate of evaporation compared to a standard

Viscosity

Measure of flow characteristics in Kinematic viscosity in Centistokes.

Hazardous Polymerization

Hazardous polymerization is that reaction which takes place at a rate which produces large amounts of energy. Indicates whether it may or may not occur and under what storage conditions.

Does the Material React Violently

Indicates whether the material will react violently, releasing large amounts of energy when exposed under conditions listed.

Composition

Components of the product as required by OSHA (1910.1200) and one or more state Right to Know laws.

Texaco Inc.
2000 Westchester Avenue
White Plains, New York 10650
Phone (914) 831-3400 (Beacon)

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE. IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT AS PART OF TEXACO'S PRODUCT SAFETY PROGRAM. IT IS NOT INTENDED TO CONSTITUTE PERFORMANCE INFORMATION CONCERNING THE PRODUCT. NO EXPRESS WARRANTY, OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE WITH RESPECT TO THE PRODUCT OR THE INFORMATION CONTAINED HEREIN. DATA SHEETS ARE AVAILABLE FOR ALL TEXACO PRODUCTS. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL TEXACO PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE AND YOU ARE ENCOURAGED AND REQUESTED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

EXPLANATION OF THE INDUSTRIAL HYGIENE, TOXICOLOGY, AND MATERIAL SAFETY DATA SHEET

PRODUCT INFORMATION

Trade Name and Synonyms

Refer to the code number and name under which the product is marketed and the common commercial name of the product.

Manufacturer's Name and Address Self explanatory.

Chemical Name and/or Family or Description

Refer to chemical, generic, or descriptive name of single elements and compounds.

For purposes of this form, a product is defined as hazardous if it possesses one or more of the following characteristics: (1) has a flash-point below 200 degrees Fahrenheit, closed cup or subject to spontaneous heating; (2) has a threshold limit value as established by the American Conference of Governmental Industrial Hygenists and/or the Occupational Safety and Health Administration (with exception to petroleum oil mist). (3) a single dose oral LD50 below 500 mg/kg; (4) causes burns to the skin in the short-term exposure or is systemically toxic by skin contact; (5) has been demonstrated to be a skin or eye irritant or causes respiratory irritation; (6) may cause skin or respiratory sensitization; (7) has teratogenic, mutagenic or other toxic effects; (8) may cause asphyxia or pneumoconiosis; (9) in the course of normal operations may produce dusts, gases, fumes, vapor, mist, or smoke which have one or more of the above characteristics; (10) contains a component which may be carcinogenic according to NTP (National Toxicology Program), IARC (International Agency for Research on Cancer), OSHA (Occupational Safety and Health Administration), EPA (Environmental Protection Agency) and/or NCI (National Cancer Institute.); (11) has a median LC50 (RATS) in air of 200 ppm or less by volume of gas or vapor or 2.0 mg/l or less of mist, fume or dust when administered by continuous inhalation for one hour; (12) is a hazard as identified in the Product Shipping Label on page 5.

OCCUPATIONAL CONTROL PROCEDURES

(Consult your Industrial Hygienist or Occupational Health Specialist)

Protective Equipment

Type of protective equiment that is necessary for the safe handling and use of this product.

Ventilation

Normal means adequate to maintain permissible concentrations.
Ventilation: type, i.e. local exhaust, mechanical, etc.

Permissible Concentrations

Indicates Threshold Limit Value (TLV) and/or Time Weighted Average (TWA) as established by the American Conference of Governmental Industrial Hygienists and/or standards promulgated by the Occupational Safety and Health Administration.

EMERGENCY AND FIRST AID PROCEDURES

Administer first aid and emergency procedures in case of eye and/or skin contact, ingestion and inhalation.

PHYSIOLOGICAL EFFECTS

Acute Exposures (Eye, Skin, Respiratory System)

Refers to the most common effects that would be expected to occur from direct contact with the product.

Chronic

Refers to the effects that are most likely to occur from repeated or prolonged exposure.

Sensitizer

Means a substance which will cause on or in normal living tissue, through an allergic or photodynamic process, a hypersensitivity which becomes evident on reapplication of, or exposure to, the same substance.

Median Lethal Dose or Concentration (LD50,LC50)

Refers to that dose or concentration of the material which will produce death in 50 per cent of the animals. For inhalation, exposure time is indicated.

Irritation Index

Refers to an empirical score (Draize Method) for eye and skin irritation when tested by the method described. If numbers are not available, an estimated score indicates whether or not the material is an irritant.

FIRE PROTECTION INFORMATION

Ignition Temperature

Refers to the temperature in degrees Fahrenheit, at which a liquid will give off enough flammable vapor to ignite and burn continuously for 5 seconds.

Flash Point (Method used)

Refers to the temperature in degrees Fahrenheit, at which a liquid will give off enough flammable

ADDITIONAL COMMENTS	Code No. 75733

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT
STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985)
No critical materials present.

-

To determine applicability or effect of any law or regulation with respect to the product, users should consult his legal advisor or the appropriate government agency. Texaco does not undertake to furnish advice on such matters.

By F. E. Bentley Title Coordinator of Product Safety

Date 01-28-86 ☐ New ☒ Revised, Supersedes 01-09-86

DUCT SHIPPING LABEL

Code No. 75733

75733 TEXSOLVE S-2

WARNING! CAUSES IRRITATION TO EYES
MAY CAUSE IRRITATION TO SKIN
COMBUSTIBLE

Avoid contact with eyes and prolonged contact with skin.
Keep away from heat and flame.
Use only in well-ventilated locations.
Avoid prolonged breathing of mist or vapor.
Keep head away from container when opening or dispensing.
Wash thoroughly after handling.

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.
Wash skin with soap and plenty of water.
If swallowed, DO NOT induce vomiting.
Call a doctor immmediately.

In case of fire use water spray, foam. dry chemical or CO2.

Chemical/Common Name	CAS No.	Range in %
Mixture C9-C10 aliphatic hydrocarbons	64742887	100.00

Evaluation of this product indicates that it is hazardous according to OSHA Appendix A criteria and/or Texaco's hazard criteria.

HMIS
Health : 1 Reactivity : 0
Flammability: 2 Special : -

DOT Proper Shipping Name: Petroleum Naphtha
DOT Hazardous Class : Combustible Liquid, UN 1255

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame or heat. Keep container closed and drum bungs in place.

HEALTH EMERGENCY TELEPHONE: (914) 831-3400 (EXT. 204)

Texaco Inc.
2000 Westchester Avenue
White Plains, New York 10650

For Additional Information Concerning
Fuels/Lubricants/Antifreezes
call (914) 831-3400 (EXT.204)
Chemicals/Additives
call (409) 722-8381
Transportation Spills
call CHEMTREC (800) 424-9300

COMPOSITION

Code No. 75733

Chemical/Common Name	CAS No.	Exposure Limit	Range in %
Mixture C9-C10 aliphatic hydrocarbons	64742887		100.00

Evaluation of this product indicates that it is hazardous according to OSHA Appendix A criteria and/or Texaco's hazard criteria.

ENVIRONMENTAL PROTECTION

Code No. 75733

Waste Disposal Method:
Re-evaluation of the product may be required by the user at the time of disposal, since the product uses, transformations, mixtures and processes may change classification to non-hazardous or hazardous for reasons other than, or in addition to ignitability. (See Remarks for Waste Classification.)

Procedures in Case of Breakage or Leakage: (Transportation Spills Call CHEMTREC (800) 424-9300)
Avoid contact with eyes. Ventilate area. Avoid breathing vapor. Use self-contained breathing apparatus or supplied-air mask for large spills in confined area. Contain spill if possible. Wipe up or absorb on suitable material and shovel up.

Remarks:
Waste Classification: Product (as presently constituted) has the RCRA characteristic of ignitability and if discarded in its purchased form would have the hazardous waste number D001.

PRECAUTIONS

WARNING! CAUSES IRRITATION TO EYES
MAY CAUSE IRRITATION TO SKIN
COMBUSTIBLE

Avoid contact with eyes and prolonged contact with skin.
Keep away from heat and flame.
Use only in well-ventilated locations.
Avoid prolonged breathing of mist or vapor.
Keep head away from container when opening or dispensing.
Wash thoroughly after handling.

Requirements for Transportation, Handling and Storage:
Store away from heat and open flame. Placard required only when material is contained in packaging or container that exceeds 110 gallons, or in tank car or tank truck. Transport, handle, and store in accordance with OSHA Regulation 1910.106 and applicable DOT Regulations.

DOT Proper Shipping Name: Petroleum Naphtha
DOT Hazard Class (if applicable): Combustible Liquid, UN 1255

CHEMICAL AND PHYSICAL PROPERTIES

Boiling Point (°F) 305-335 Vapor Pressure 8 @ 38 C (mmHg)

Specific Gravity 0.774 (H_2O=1) Vapor Density 4.73 (Air=1)

Appearance and Odor Clear, colorless liquid; sweet naphtha odor

pH of undiluted product N.A. Solubility Neg.

Percent Volatile by Volume 100 Evaporation N.D. ( )=1

Viscosity N.D. Other -

Hazardous Polymerizations ____ Occur X Do not occur

The Material Reacts Violently With: (If others is checked below, see additional comments on page 6 for futher details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
			X		

N.D. - Not Determined N.A. - Not Applicable

PHYSIOLOGICAL EFFECTS:

Code No. 75733

Effects of Exposure

Acute:

Eyes: Believed to cause moderate eye irritation.

Skin: Believed to be moderately irritating; Believed to cause redness, edema or drying of the skin.

Respiratory System: Overexposure to mist,vapors may cause dizziness,drowsiness,headache,nausea.Massive overexposure may cause unconsciousness,death.

Chronic: Prolonged or repeated skin contact may cause drying or cracking of skin.Similar products upon repeated and prolonged inhalation exposure to elevated concentrations were associated with kidney damage and cancer in male rats only. No similar effects were observed in mice or female rats.

Other: -

Sensitization Properties:

Skin: Yes ___ No ___ Unknown X Respiratory: Yes ___ No ___ Unknown X

Median Lethal Dose (LD_{50} LC_{50})(Species)

Oral: Believed to be > 5 g/kg (rat); practically non-toxic

Inhalation: Believed to be 3400 ppm/4 hr exposure (rat)

Dermal: Believed to be > 3 g/kg (rabbit); practically non-toxic

Other: N. D.

Irritation Index, Estimation of Irritation (Species)

Skin: Believed to be 3-5/8.0 (rabbit); moderately irritating

Eyes: Believed to be 25-50/110 (rabbit); moderately irritating

Symptoms of Exposure: See above.

FIRE PROTECTION INFORMATION

Ignition Temp. °F. 450 F

Flash Point °F. (Method) 102 F (CC)

Flammable Limits (%) Lower 1.1 Upper 6.1

Products Evolved When Subjected to Heat or Combustion:

Carbon monoxide and carbon dioxide may be formed on burning in limited air supply.

Recommended Fire Extinguishing Agents And Special Procedures:

According to the National Fire Protection Guide 49, combustible liquid fires may be extinguished by water spray, dry chemical, foam or carbon dioxide. Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for persons attempting to stop the leak.

Unusual or Explosive Hazards:

None.

N.D. - Not Determined N.A. - Not Applicable

< - Less Than > - Greater Than

TEXACO INC.
INDUSTRIAL HYGIENE, TOXICOLOGY, AND MATERIAL SAFETY DATA SHEET

NOTE: NO REPRESENTATION IS MADE AS TO THE AC
HEREIN. SEE PAGE 7 FOR CONDITIONS UNDER

OWL 8/1/91

Trade Name and Synonyms
75733 TEXSOLVE S-2

Manufacturer's Name
Texaco Chemical Company

Emergency Telephone No.
(409) 722-8381

Address
4800 Fournace Place P.O. Box 430 Bellaire, TX 77401

Chemical Name and/or Family or Description
Mineral spirits

THIS PRODUCT IS CLASSIFIED AS:

X HAZARDOUS BY DEFINITION NO.(S) 1,5

____ NOT HAZARDOUS:

____ ON ATTACHED EXPLANATION SHEETS

WARNING STATEMENT:

WARNING! CAUSES IRRITATION TO EYES
MAY CAUSE IRRITATION TO SKIN
COMBUSTIBLE

OCCUPATIONAL CONTROL PROCEDURES

Protective Equipment (Type)

Eyes: Chemical type goggles must be worn. Do not wear contact lenses.

Skin: Protective clothing such as uniforms, coveralls or lab coats should be worn. Launder or dry clean when soiled. Gloves resistant to chemicals and petroleum distillates required.

Inhalation: None required when handling at minimum feasible temperatures.

Ventilation: Normal

Permissible Concentrations:

Air: None established

EMERGENCY AND FIRST AID PROCEDURES

First Aid

Eyes: Flush thoroughly with water for at least fifteen minutes. Get medical attention.

Skin: Wash exposed areas with soap and water.

Ingestion: Do NOT induce vomiting. Aspiration may cause chemical pneumonia.

Inhalation: Remove patient to fresh air. If not breathing, give mouth-to-mouth artificial respiration.

Other Instructions: None.

N.D. - Not Determined N.A. - Not Applicable

Volclay GPG 30

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER CCPC-00-0230

Out 8/1/91

105 01

Material Safety Data Sheet

Required under USDL Safety and Health Regulations for Shipyard Employment (29 CFR 1915)

OMB No. 1218-0074
Expiration Date 05/31/86

ISSUE 11/85 CC: a LC: B

CAS NO. 1302-78-9

Section I

Manufacturer's Name: American Colloid Company

Emergency Telephone Number: 312-966-5720

Address (Number, Street, City, State, and ZIP Code): 5100 Suffield Court, Skokie, Illinois 60077

Chemical Name and Synonyms: Bentonite "Colloidal Clay"

Trade Name and Synonyms: Volclay GPG 30

Chemical Family: Hydrous Aluminum Silicates

Formula: $(Al,Fe_{1.67}Mg_{.33})Si_4O_{10}(OH)_2, Na^+Ca^{++}/2_{.33}$

Section II - Hazardous Ingredients

Paints, Preservatives, and Solvents	%	TLV (Units)	Alloys and Metallic Coatings	%	TLV (Units)
Pigments	0	N/A	Base Metal	0	N/A
Catalyst	0	N/A	Alloys	0	N/A
Vehicle	0	N/A	Metallic Coatings	0	N/A
Solvents	0	N/A	Filler Metal Plus Coating or Core Flux	0	N/A
Additives	0	N/A	Others Respirable Crystalline Silica *(Less than 1%)	*	See Sec. V.
[illegible]rs	0	N/A			

Hazardous Mixtures of Other Liquids, Solids or Gases

	%	TLV (Units)

Section III - Physical Data

Boiling Point (°F)	N/A	Specific Gravity (H_2O=1)	2.5
Vapor Pressure (mm Hg.)	N/A	Percent Volatile by Volume (%)	N/A
Vapor Density (AIR=1)	N/A	Evaporation Rate (_____ =1)	N/A

Solubility in Water: Moderate - 3%

Appearance and Odor: Pale grey to buff color, odorless

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used): N/A

Flammable Limits: N/A | Lel | Uel

Extinguishing Media: N/A

Special Fire Fighting Procedures: N/A

Unusual Fire and Explosion Hazards: N/A

Section V - Health Hazard Data

Threshold Limit Value

Respirable Mass 5 mg/m^3 Total Mass 15 mg/m^3

Effects of Overexposure

May be harmful if inhaled over prolonged period and may cause delayed lung injury.

Emergency First Aid Procedures

N/A

Section VI - Reactivity Data

Stability	Unstable		Conditions to Avoid N/A
	Stable	X	

Incompatability (Materials to Avoid) N/A

Hazardous Decomposition Products N/A

Hazardous Polymerization	May Occur		Conditions to Avoid N/A
	Will Not Occur	X	

Section VII - Spill or Leak Procedures

Steps to be Taken in Case Material is Released or Spilled

Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear approved respirator. Avoid adding water, the product will become slippery when moistened

Waste Disposal Method

Sanitary Landfill

Section VIII - Special Protection Information

Respiratory Protection (Specify Type) NIOSH/MSHA approved respirator

Ventilation	Local Exhaust: Required	Special: N/A
	Mechanical (General): N/A	Other: N/A

Protective Gloves: N/A

Eye Protection: Optional use of Goggles

Other Protective Equipment: N/A

Section IX - Special Precautions

Precautions to be Taken in Handling and Storing Avoid breathing dust. Use NIOSH/MSHA approved respirator where TLV limits for Crystalline Silica may be exceeded.

Other Precautions

Slippery when wet.

SPILL, LEAK & DISPOSAL INFORMATION

Waste Disposal: Dispose of in accordance with all local state and federal regulations. Disposal by incineration in an approved incinerator is recommended.

Spill or Leakage Procedures: Contain spilled material and absorb with clay, saw dust or other absorbent material. Place all spilled material, contaminated sorbent materials, contaminated dirt, and other contaminated material in drums. Keep material out of watersheds and water systems.

OTHER REGULATORY REQUIREMENTS

Based upon ingestion of NTA in lifetime feeding studies. NTA has been shown to induce tumors in the urinary tracts of rats and mice. Nitrilotriacetic acid , in a National Toxicology Program listed carcinogen and is identified as a hazardous chemical, under criteria of OSHA Hazard Communication Standard (29CFR 1910.1200).

WRITTEN BY: Lee Tempel
REVISION DATE: 9-30087

REACTIVITY DATA

Materials to Avoid: None

Hazardous Decomposition Products: N/A

PHYSIOLOGICAL EFFECTS SUMMARY

PHYSICAL DATA

Appearance: Clear-white liquid, mild odor.

Specific Gravity @ 20°C/4°C: 1.080 at 77° F.

Boiling Point @ 760 mm Hg: Above 20°C

Vapor Pressure @ N/A

Vapor Density (Air = 1): N/A

Percent Volatile by Volume: N/A

EMERGENCY AND FIRST AID PROCEDURES

If in eyes, immediately flush with plenty of water. Call a physician if irritation persists.

If on skin, immediately flush with plenty of water. Wash clothing before re-use.

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Caution- Eye Irritant. Avoid contact. Chemical workers use splash-proof goggles where eye contact may be a problem.

Skin Protection: If prolonged or repeated contact is possible: Rubber, PVC or other impervious material.

Respiratory Protection: No special requirements under normal use conditions. If mists/ vapors are not adequately controlled by local ventilation, use appropriate respiratory protection.

Ventilation: General room ventilation is normally adequate. Substantial amounts of mists/ vapors can be controlled with local exhaust ventalation or respiratory protection.

Airborne Exposure Limits: N/A

FIRE PROTECTION INFORMATION

Flash Point: N/A

Auto Ignition Temperature: N/A

Flammable Limits in Air, % by Vol. @ 212°F: N/A

Extinguishing Media: Foam, CO_2, Dry Chemical, Water Fog.

Unusual Fire And Explosion Hazards: Corrosive material. Container may burst in heat.

Special Firefighting Procedures Use standard approved fire fighting procedures. Keep product cool . Use caution when approaching or handling fire exposed containers.

SUPERIOR GRAPHITE CO.

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0380
ow 8/1/91

MATERIAL SAFETY DATA SHEET

IDENTITY *(As Used on Label and List)*

NO. 204 SUSPENSION

Section I

Manufacturer's Name SUPERIOR GRAPHITE CO.	Emergency Telephone Number NIGHT (312) 349-7692
Address *(Number, Street, City, and ZIP Code)* 120 SOUTH RIVERSIDE PLAZA	Telephone Number for Information DAY (312) 559-2999
CHICAGO, IL 60606	Date Prepared 3/1/88
	Signature of Preparer *(optional)* Ronald B. Vaz

Section II – Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
PURIFIED NATURAL GRAPHITE C.A.S. #7782-42-5	5 mg/m^3	5 mg/m^3	NONE	PROP.
PETROLEUM HYDROCARBONS # UNK.	UNK.	UNK.	UNK.	PROP.

Section III – Physical/Chemical Characteristics

Boiling Point	212° F	Specific Gravity (H_2O = 1)	UNK.
Vapor Pressure (mm Hg.)	NONE	Melting Point	NONE
Vapor Density (AIR = 1)	NONE	Evaporation Rate (Butyl Acetate = 1)	NONE

Solubility in Water

NEGLIGIBLE

Appearance and Odor

BLACK LIQUID - OIL SMELL

Section IV – Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
NONE		NONE	NONE

Extinguishing Media

WATER -- CO_2 -- FOAM -- REMOVE OXYGEN SOURCE

Special Fire Fighting Procedures

CUT OFF OXYGEN SUPPLY

Unusual Fire and Explosion Hazards

NONE

Section V – Reactivity Data

Stability	Unstable		Conditions to Avoid: STRONG OXIDIZERS
	Stable	XX	

Incompatibility *(Materials to Avoid)*: STRONG OXIDIZERS

Hazardous Decomposition or Byproducts: NONE

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	XX	STRONG OXIDIZERS BURNING MAY PRODUCE CARBON MONOXIDE

Section VI – Health Hazard Data

Route(s) of Entry: Inhalation? REMOVE TO FRESH AIR | Skin? WASH WITH SOAP & WATER | Ingestion? DRINK WARM MILK/WATER CALL A DOCTOR

Health Hazards *(Acute and Chronic)*: UNK.

Carcinogenicity: NTP? NO | IARC Monographs? NO | OSHA Regulated? NO

Signs and Symptoms of Exposure: POSSIBLY ALLERGENIC

Medical Conditions Generally Aggravated by Exposure: MINOR IRRITATION TO EYES, NASAL PASSAGES

Emergency and First Aid Procedures: FOR DUST/VAPORS-REMOVE FROM THE AREA

Section VII – Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled: USE ABSORBENT MATERIAL -SWEEP UP

Waste Disposal Method: DISPOSE OF IN ACCORDANCE TO LOCAL, STATE & FEDERAL REGULATIONS

Precautions to Be Taken in Handling and Storing: NONE

Other Precautions: NONE

Section VIII – Control Measures

Respiratory Protection *(Specify Type)*: USE OSHA APPROVED DUST MIST MASKS

Ventilation	Local Exhaust: USE AMBIENT AMT. OF AIR	Special: NONE
	Mechanical *(General)*: AS ABOVE	Other: NONE

Protective Gloves: WEAR RUBBER GLOVES | Eye Protection: WEAR GOGGLES

Other Protective Clothing or Equipment: USE OLD WORK CLOTHES

Work/Hygienic Practices: USE IN WELL VENTILATED AREA

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER COPC-00-0331
8/1/91

Manufacturer:

ICI AMERICAS, Inc.
WILMINGTON, DELAWARE 19897

GRAMOXONE SUPER

Emergency Phone No. 302-575-3000

HEALTH HAZARDS

Oral	LD_{50}	Dermal
40 mg/kg		240 mg/kg

Oral	LD_{oz} 185 lb. Man	Dermal
.12 oz.		.720 oz.

TLV

.1 mg/m^3

FIRST AID

SWALLOWING: Give one or more glasses of water to drink and induce vomiting by sticking finger down throat. Repeat until vomit is clear. Get immediate medical attention. If bentonite, activated charcoal or fuller's earth is available, administer it.

EYES: Immediately flush with plenty of water for at least 15 minutes and have eyes examined and treated by an eye specialist.

SKIN: Wash skin thoroughly with plenty of soap and water. Get medical attention.

INHALATION: Move victim to uncontaminated area and get immediate medical attention.

NOTE TO PHYSICIAN
From manufacturers data sheet or label

There is no effective antidote for oral paraquat poisoning. Prompt treatment is ESSENTIAL following ingestion. Paraquat is inactivated by its tight bonding to clay. Absorption can be reduced by administering absorbents such as BENTONITE, ACTIVATED CHARCOAL or FULLER'S EARTH. A cathartic should also be given. In selected cases of paraquat poisoning, the modalities of hemoperfusion and hemodialysis may be considered.

FIRE

Flash Point: N/A
Extinguishing Agents: N/A

Special Hazards: Fire conditions will form highly toxic smoke and vapors.

SPILLS

Mix with a generous amount of clay or clay-containing soil and shovel into waste container.
Dispose of in accordance with local, state, and federal regulations.

RQ No.

PLACARD

SHIPPING PAPER ID

Bipyridilium pesticide liquid, N.O.S. Poison B, UN 2757

UN No.
NA No.

OTHER COMMENTS

Corrosive to mild steel, galvanized iron and aluminum.
The health hazard assessment is based on the results of animal toxicity testing and reports of accidental human exposure.
Grave poisonings and deaths have been reported after accidental or suicidal ingestions. Signs and symptoms following ingestion include burning sensations, ulcerations of the mouth, tongue, pharynx and esophagus; vomiting, retching, and diarrhea may then ensue. A 2 to 3 week period of progressive kidney failure, liver complications, pulmonary insufficiency (SEE REVERSE)

Date 4/88

NAME GRAMOXONE SUPER

CHEMICAL FAMILY

FORMULA Contains: 23.39% paraquat dichloride (CAS. 1910-42-5)

PHYSICAL DATA

BOILING POINT	214°F, 101°C	SPECIFIC GRAVITY $H_2O = 1$	1.065
VAPOR PRESSURE	(mmHg@20°C): No Data	PER VOLATILE BY VOLUME (%)	No Data.
VAPOR DENSITY (Air = 1)	No Data	EVAPORATION RATE	N/A
SOLUBILITY IN WATER	Soluble		
APPEARANCE & ODOR	Clear, dark greenish brown liquid with strong pungent odor.		

OTHER COMMENTS - CONTINUED:

may follow. Death is usually due to respiratory failure secondary to pulmonary fibrosis. Severe acute inflammatory changes may be the result of eye contact, reaching maximum effect in 12 to 24 hours. Surfactants tend to potentiate effects that develop after eye contact; the effects represent chemical burns. Although the eye injury may appear to be extensive, a slow but complete recovery usually occurs. Repeated and/or prolonged skin contact with the concentrated product can cause skin damage, including erythema, edema, and ulceration. Repeated and/or prolonged skin contact with the spray dilution may cause mild skin irritation. Contack with finger and toe nails may result in cracking and shedding, normal regrowth follows. Paraquat penetrates intact skin very slowly. Penetration is faster through injured or damaged skin. Prolonged contact with the concentrate can damage skin and thus poisoning can occur more readily. Lung, kidney and liver injuries can ensue, followed by renal and pulmonary insufficiency. Death ensues after respiratory failure.
Exposure to paraquat vapor is not likely to occur. Prolonged inhalation or overexposure to a spray mist of diluted paraquat can cause irritation of the upper respiratory tract mucosa, as evidenced by a burning sensation, nose bleeds, and sore throat. These symptoms remit on cessation of exposure. Systemic toxicity is unlikely to develop following inhalation because spray aerosols are not likely to be of respirable size. Effects of overexposure: The greatest hazards of paraquat exposure exist when the concentrated product is swallowed or allowed to remain in contact with the skin for a prolonged period. These circumstances can result in the systemic poisonous which is severe, progressive, and frequently terminates in irreversible lung damage and death. The concentrated product can cause adverse local effects on eyes, skin, and nails. These problems are not normally seen with spray dilutions. Excessive exposure to spray mist can cause upper respiratory tract irritation. Protective clothing - prevent skin contact. Use impervious gloves, apron and boots. Depending upon conditions of use, additional protection may be required such as arm covers or full body suit. Remove any contaminated clothing promptly. Eye protection - chemical tight goggles with full faceshield. Other protective equipment: Eyewash station and safety shower near work area. Precautions to be taken in handling or storing: Store above 32°F in original well-marked containers away from feed or food. Material is toxic to wild life. Keep out of lakes, streams and ponds. Follow good hygiene practice to avoid skin and eye contact, breathing vapors, or accidental ingestion. Hands and face should be thoroughly washed with soap and water prior to eating, drinking or smoking. Eating, drinking or smoking should not be allowed in areas where this substance is handled. Work clothes should be laundered regularly. All protective equipment should be kept clean and stored properly.

MONSANTO PRODUCT NAME

ROUNDUP® HERBICIDE

MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO 63167

Emergency Phone No.
(Call Collect)
314-694-4000

PRODUCT IDENTIFICATION

Synonyms:	None.	
Chemical Name:	Not Applicable, Formulated Product	
Active Ingredient:	*Isopropylamine salt of glyphosate	41.0%
Inert Ingredients:	....	59.0%
		100.0%

**Contains 480 grams per liter or 4 pounds of the active ingredient isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon. Equivalent to 356 grams per liter or 3 pounds per U.S. gallon of the acid, glyphosate.*

CAS Reg. No.:	Not Applicable, Formulated Product
CAS Reg. No. Active Ingredient:	38641-94-0
EPA Reg. No.:	524-308
DOT Proper Shipping Name:	Not Applicable [redacted]
DOT Hazard Class/ I.D. No.:	Not Applicable
DOT Label:	Not Applicable
Reportable Quantity (RQ) Under Clean Water Act:	Not Applicable
U.S. Surface Freight Classification:	Weed Killing Compound, N.O.I.B.N.

The substance listed below is identified as a hazardous chemical under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200):

Surfactant, about 15%. The specific chemical identity is withheld because it is trade secret information of Monsanto Company.

WARNING STATEMENTS

Keep out of reach of children.
WARNING!
CAUSES EYE IRRITATION
HARMFUL IF SWALLOWED
MAY CAUSE SKIN IRRITATION
NOT FOR REFORMULATION OR REPACKAGING

993/EP-087

PRECAUTIONARY MEASURES

Do not get in eyes, on skin or on clothing.
Wash thoroughly after handling.
Avoid direct applications to any body of water. Do not contaminate water by disposal of waste or cleaning of equipment.

EMERGENCY AND FIRST AID PROCEDURES

FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Call a physician.

IF ON SKIN, immediately flush with plenty of water. Remove contaminated clothing. Wash clothing before reuse.

IF SWALLOWED, this product will cause gastrointestinal tract irritation. Immediately dilute by swallowing water or milk. Call a physician.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Wear chemical splash goggles during mixing/pouring operations or other activities in which eye contact with undiluted Roundup® herbicide is likely to occur.

Skin Protection: In cases in which prolonged or repeated skin contact with Roundup herbicide may occur, long-sleeved shirt, long pants, and chemical protective (e.g. rubber) gloves are recommended. Wash hands and contaminated skin after handling. Clothing soaked with Roundup solution should be promptly removed and laundered before reuse.

Respiratory Protection: Respiratory protection should not be required for normal use and handling. During periods of abnormal exposure to heavy spray or mist, use of NIOSH/MSHA approved equipment for pesticide vapor/mist is recommended. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed.

Ventilation: No specials precautions are recommended.

Airborne Exposure Limits: Product: Roundup Herbicide - 100% by wt.

OSHA PEL: None established
ACGIH TLV: None established

Surfactant ingredient: Approx. 15% by wt.

OSHA PEL: None established
ACGIH TLV: None established

FIRE PROTECTION INFORMATION

Flash Point: >200°F. ***Method:*** Tag Closed Cup

Extinguishing Media: Water spray, foam, dry chemical or CO_2 or any Class B extinguishing agent.

Special Firefighting Procedures: Firefighters and others who may be exposed to vapors or products of combustion should wear a self-contained breathing apparatus and full protective clothing. Equipment should be thoroughly cleaned after use.

Unusual Fire and Explosion Hazards: None.

REACTIVITY DATA

Stability: Stable for at least 5 years under normal conditions of warehouse storage. Heated facilities are not required.

Incompatibility: This product and spray solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, fiberglass, plastic and plastic lined containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Hazardous Decomposition Products: None.

Hazardous Polymerization: Does not occur. This product can react with caustic (basic) materials to liberate heat. This is not a polymerization but rather a chemical neutralization in an acid-base reaction.

HEALTH EFFECTS SUMMARY

The following information presents both human experience and the results of scientific experiments used by qualified experts to assess the effects of Roundup herbicide on the health of exposed individuals and to support the Precautionary Statements and Occupational Control Procedures recommended in this document. To avoid misunderstanding, the data provided in this section should be interpreted by individuals trained in evaluation of this type of information.

Human Experience

Dermal contact and inhalation are expected to be the primary routes of occupational exposure to Roundup herbicide. Direct contact with this material may cause temporary eye irritation and conjunctivitis. Prolonged contact with Roundup herbicide may cause dermal irritation. Ingestion of Roundup herbicide has been reported to produce gastrointestinal discomfort, nausea, vomiting and diarrhea.

Toxicological Data

Data from Monsanto studies indicate the following:

Oral LD_{50} (Rat):	5,400 mg/kg, Practically Nontoxic
Dermal LD_{50} (Rabbit):	>5,000 mg/kg, Practically Nontoxic
Eye Irritation (Rabbit, 24-hr):	(FHSA) Score = 4.1 on a scale of 110.0, Slightly Irritating
Skin Irritation (Rabbit, 24-hr):	(FHSA) Score = 4.3 on a scale of 8.0, Moderately Irritating
DOT Skin Irritation (Rabbit, 4-hr):	Not Corrosive
Inhalation LC_{50} (Rat, 4-hr):	3.18 mg/l (analytical concentration), Slightly Toxic

Patch testing of 50 human volunteers with Roundup herbicide at use concentration and 5X use concentration produced no positive reactions following initial application, any of 15 repeated applications in the induction phase, or on subsequent challenge 2 weeks later. Roundup herbicide is not considered a primary irritant or a sensitizing agent.

Patch testing of guinea pigs with Roundup herbicide produced essentially no irritation following initial application; mild to moderate erythema (redness), edema (swelling) and/or mild necrosis (tissue damage) were observed in some animals during subsequent repeated exposures in the induction phase. On challenge, no dermal response was observed in any of the animals. Roundup herbicide is not considered a dermal sensitizing agent in guinea pigs.

(Health Effects Summary Continued On Next Page)

HEALTH EFFECTS SUMMARY (Continued)

Single male and female dogs were orally administered Roundup herbicide or a 2 percent aqueous solution of Roundup herbicide at dosages ranging from 0.3125 to 5.0 ml/kg. No mortality and no inhibition of plasma acetylcholinesterase activity were reported. The most common effects observed were vomiting and diarrhea, which occurred shortly after dosing.

A series of 21-day dermal toxicity studies have been conducted in which Roundup herbicide was applied to the skin of male rabbits 6 hours per day, 5 days per week at various concentrations. At 5 times the intended use concentration, severe dermal irritation and systemic toxicity (mortality, reduced food consumption, body weight loss, and testicular effects) were observed. Rabbits treated with 3 times the intended use concentration and below, or only with the active ingredient glyphosate, exhibited only slight to moderate local irritation and had no signs of systemic effects. When the surfactant in Roundup formulation was tested, marked irritation and systemic effects were observed which were similar to those seen with the higher concentration of Roundup. Effects observed in these studies are considered to be a secondary response to the stress of severe dermal irritation, to which rabbits are particularly sensitive, rather than the result of direct systemic toxicity.

Rats were exposed by inhalation to aerosol concentrations of 0.05, 0.16 and 0.36 mg of a 33.3% Roundup solution per liter air 6 hours/day, 5 days/week for a total of 22 exposures over a 4 week period. Minor nasal irritation was observed in female animals. No adverse hematologic, biochemical or systemic histopathologic effects were noted. The systemic no-effect level was considered to be 0.36 mg of a 33.3% Roundup solution per liter of air.

Following a 24-hr topical application of Roundup herbicide to the abdomen of rhesus monkeys, approximately 1.8 percent of the administered dose of the active ingredient (glyphosate) was systemically absorbed. Excretion in the urine was the major route of elimination following systemic absorption.

Components

Data from Monsanto studies and from the scientific literature on the components of Roundup herbicide is discussed below:

Isopropylamine Salt of Glyphosate (MON 0139)

The isopropylamine salt of glyphosate (MON 0139) has been tested in acute and subchronic toxicity studies. For additional toxicity information on this material, please refer to the MON 0139 Material Safety Data Sheet.

Surfactant

The surfactant properties of this material are considered to contribute to the eye and skin irritation potential of Roundup herbicide.

PHYSICAL DATA

Appearance: Clear, viscous amber-colored solution.

Odor: Practically odorless to slight amine-like odor.

pH: 4.4 - 4.9

Specific Gravity (Water = 1): 1.17

SPILL AK & DISPOSAL INFORMATION

Spill/Leak:

Observe all protective and safety precautions including use of rubber boots or rubber overshoes when cleaning up spills — See Occupational Control Procedures.

Liquid spills on floor or other impervious surfaces should be contained or diked, and should be absorbed with attapulgite, bentonite or other absorbent clays (kitty litter, etc.) Collect contaminated absorbent, place in plastic lined metal drum and dispose of in accordance with instructions provided under DISPOSAL. Thoroughly scrub floor or other impervious surfaces with a strong industrial type detergent solution and rinse with water.

Liquid spills that soak into the ground should be dug-up, placed in plastic lined metal drums and disposed of in accordance with instructions provided under DISPOSAL.

Leaking containers should be separated from non-leakers and either the container or its contents transferred to a plastic lined drum or other non-leaking container and disposed of in accordance with instructions provided under DISPOSAL. Any recovered spilled liquid should be similarly collected and disposed of.

Do not contaminate water, foodstuffs, seed or feed by storage and disposal.

Disposal:

Materials resulting from the use of this product should be used according to label instructions if possible. Wastes that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or buried on site in a safe place so that it will not contaminate water supplies. All disposal should be in accordance with applicable Federal, State or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed. DO NOT CUT OR WELD ON OR NEAR THIS CONTAINER.

Metal Drums and Cans: Triple rinse container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Plastic Containers: Do not reuse container. Triple rinse container then puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Plastic may be burned or incinerated if permissible under state and local rules. If burned, stay out of smoke.

Bulk: Triple rinse emptied bulk containers. Then offer for recycling or reconditioning or disposal in a manner approved by state and local authorities.

ADDITIONAL COMMENTS

Environmental Toxicity Information:

Oral LD_{50} Goat:	4,860 mg/kg, Slightly Toxic
48-hr LD_{50} Honeybee:	>100 µg/bee, Practically Nontoxic
48-hr EC_{50} *Daphnia magna* (With Aeration):	37 mg/l, Slightly Toxic
48-hr EC_{50} *Daphnia magna* (Without Aeration):	24 mg/l, Slightly Toxic
48-hr EC_{50} *Gammarus pseudolimneaus:*	42 mg/l, Slightly Toxic
96-hr TL_{50} Carp:	19.7 ppm, Slightly Toxic
96-hr LC_{50} Bluegill sunfish (Static):	14 mg/l, Slightly Toxic

(Additional Comments Continued On Next Page)

ADDITIONAL COMMENTS (Continued)

96-hr LC_{50} Bluegill sunfish (Flow-Through):	5.8 mg/l, Moderately Toxic
96-hr LC_{50} Rainbow trout (Static):	22 mg/l, Slightly Toxic
96-hr LC_{50} Rainbow trout (Flow-Through):	8.2 mg/l, Moderately Toxic
96-hr LC_{50} Channel catfish:	16 mg/l, Slightly Toxic
96-hr LC_{50} Fathead Minnow:	9.4 mg/l, Moderately Toxic
96-hr LC_{50} Crayfish:	>1,000 ppm, Practically Nontoxic

Carp contained in a static pond were unaffected at any time during a 90-day observation period following exposure by aerial application of Roundup herbicide at the normal use concentration. Tissue residue analyses indicated that glyphosate, the active ingredient in Roundup herbicide, will not bioaccumulate.

Immersion of chicken eggs at four different embryo ages (0, 6, 12 and 18 days) for about five seconds in 1 or 5% vol/vol Roundup in water solutions was reported to have no adverse effects on the hatchability or time to hatch of the eggs.

DATE: November, 1985 **SUPERSEDES:** March, 1982

MSDS NO.: M00007588

FOR ADDITIONAL NON-EMERGENCY INFORMATION, CALL: 314-694-4000

ZEP MANUFACTURING COMPANY
FIRST IN MAINTENANCE PRODUCTS

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 ZEP HI FOAM DEGREASER
SUPERSEDES: 04/21/89 PRODUCT NUMBER: 0358

SECTION III - HEALTH HAZARD DATA (CONTINUED)

CHRONIC EFFECTS OF OVEREXPOSURE:
REPEATED OR PROLONGED, SKIN CONTACT MAY PRODUCE MILD CENTRAL NERVOUS SYSTEM DEPRESSION, CHARACTERIZED BY HEADACHE, NAUSEA, STUPOR, AND COMA. SKIN WHICH IS DEFATTED BY REPEATED EXPOSURE TO HYDROCARBON SOLVENTS IS MORE SUSCEPTIBLE TO IRRITATION, INFECTION, AND DERMITITIS. ANIMAL STUDIES OF THE EFFECTS OF PROLONGED INHALATION INDICATED A POTENTIAL FOR LUNG DAMAGE AND BLOOD PRODUCTION ABNORMALITIES, SOME OF WHICH WERE FATAL. RELEVANCE OF THESE STUDIES TO HUMAN HEALTH AND THE LEVELS OF EXPOSURE WHICH MIGHT PRODUCE THESE RESULTS, HAS NOT BEEN ESTABLISHED.
NONE OF THE HAZARDOUS INGREDIENTS ARE LISTED AS CARCINOGENS BY IARC, NTP, & OSHA
SEE SECTION 9 FOR MORE INFORMATION.

EST'D PEL/TLV: NOT ESTABLISHED PRIMARY ROUTES OF ENTRY: INH, SKIN.

HMIS CODES: HEALTH 2; FLAM. 2; REACT. 0; PERS. PROTECT. X ; CHRONIC HAZ. YES

FIRST AID PROCEDURES:
SKIN : WASH CONTAMINATED SKIN THROUGHLY WITH SOAP OR A MILD DETERGENT. APPLY A SKIN CREAM WITH LANOLIN. GET MEDICAL ATTENTION IF IRRITATION PERSISTS.
EYES : IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, OCCASIONALLY LIFTING UPPER AND LOWER LIDS. GET MEDICAL ATTENTION AT ONCE.
INHALE: MOVE EXPOSED PERSON TO FRESH AIR AT ONCE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.
IN GT: IF SWALLOWED, DO NOT INDUCE VOMITING. IF VOMITING OCCURS, KEEP HEAD BELOW HIP LEVEL. GET EMERGENCY MEDICAL ATTENTION IMMEDIATELY.

SECTION IV - SPECIAL PROTECTION INFORMATION

PROTECTIVE CLOTHING : WEAR NEOPRENE, NITRILE, OR NATURAL RUBBER GLOVES OR GLOVES WITH PROVEN RESISTANCE TO THE INGREDIENTS LISTED.
EYE PROTECTION : WEAR SPLASH-PROOF SAFETY GOGGLES ESPECIALLY IF CONTACT LENSES ARE WORN.
RESPIRATORY PROTECTION: IF VENTILATION IS INADEQUATE, WEAR A PROPERLY FITTING MSA OR OSHA-APPROVED RESPIRATOR.
VENTILATION : VENTILATION SHOULD BE EQUAL TO OUTDOORS. USE EXHAUST FANS AND/OR EXHAUST HOOD IN ENCLOSED SPACES.

SECTION V - PHYSICAL DATA

BOILING POINT (F)	: 202-550F	SPECIFIC GRAVITY	: 0.97
VAPOR PRESSURE(MMHG)	: < 1.0	PERCENT VOLATILE BY VOLUME (%)	: 33W/W
VAPOR DENSITY(AIR=1)	: > 1	EVAPORATION RATE(BUTYL ACETATE =1)	: < 0.1
SOLUBILITY IN WATER	: EMULSIFIES	PH(CONCENTRATE)	: N/A
		PH(USE DILUTION OF)	: N/A

APPEARANCE AND ODOR : A CLEAR, RED-ORANGE LIQUID HAVING A STRONG AROMATIC ODOR.

SECTION VI - FIRE AND EXPLOSION DATA

FLASH POINT(F) (METHOD USED): 145 F (TCC)
FLAMMABLE LIMITS LEL 1.0 UEL 8.0
EXTINGUISHING MEDIA : CO2, DRY CHEMICAL, FOAM
SPECIAL FIRE FIGHTING: FIRE EXPOSED DRUMS SHOULD BE COOLED WITH STREAM OF WATER.
UNUSUAL FIRE HAZARDS : WEAR SELF-CONTAINED POSITIVE PRES. BREATHING APPARATUS.

SECTION VII - R E A C T I V I T Y D A T A

STABILITY : STABLE
INCOMPATIBILITY(AVOID) : HEAT, OPEN FLAME, SPARK, AND OXIDIZING AGENTS
POLYMERIZATION : WILL NOT OCCUR.
HAZARDOUS DECOMPOSITION: CARBON DIOXIDE, CARBON MONOXIDE, & OXIDES OF NITROGEN

SECTION VIII - S P I L L A N D D I S P O S A L P R O C E D U R E S

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
IMMEDIATELY ELIMINATE ALL FLAME, IGNITION AND HIGH-HEAT SOURCES. ABSORB SPILL ON INERT ABSORBENT MATERIAL (eg ZEP-O-ZORB). PICK UP AND PLACE RESIDUE IN A CLEAN, D.O.T. SPECIFICATION CONTAINER FOR DISPOSAL. WASH AREA THOROUGHLY WITH A DETERGENT SOLUTION AND RINSE WELL WITH WATER.

WASTE DISPOSAL METHOD:
LIQUID WASTES ARE NOT PERMITTED IN LANDFILLS. PRODUCT IS NOT CONSIDERED A HAZARDOUS WASTE UNDER RCRA. UNUSABLE LIQUID MAY BE ABSORBED ON AN INERT ABSORBENT (e.g. ZEP-O-ZORB), DRUMMED AND TAKEN TO A CHEMICAL OR INDUSTRIAL LANDFILL. PRETREATMENT MAY BE REQUIRED BEFORE LANDFILLING. CONSULT LOCAL, STATE, OR FEDERAL AGENCIES FOR PROPER DISPOSAL IN YOUR AREA.

RCRA HAZ. WASTE NOS. : N/A

SECTION IX - S P E C I A L P R E C A U T I O N S

PRECAUTIONS TO BE TAKEN WHEN HANDLING AND STORING:
ANIMAL STUDIES INDICATE A POTENTIAL FOR LIVER, KIDNEY, OR RED BLOOD CELL DAMAGE. RELEVANCE OF THESE STUDIES OR EXPOSURE LEVELS WHICH MIGHT PRODUCE THESE EFFECTS IN HUMANS HAS NOT BEEN ESTABLISHED.
COMBUSTIBLE! STORE AND USE AWAY FROM HEAT, SPARKS, OPEN FLAME, OR ANY SOURCE OF IGNITION.
STORE TIGHTLY CLOSED CONTAINER IN A DRY AREA AT TEMPS. BETWEEN 40-120 DEGREES F.
KEEP PRODUCT AWAY FROM SKIN AND EYES.
DO NOT BREATHE SPRAY MISTS OR VAPORS.
KEEP OUT OF THE REACH OF CHILDREN.

SECTION X - T R A N S P O R T A T I O N D A T A

DOT PROPER SHIPPING NAME
NONE
DOT HAZARD CLASS: N/A
DOT I.D. NUMBER : N/A DOT LABEL/PLACARD: NONE
EP TSCA CHEMICAL INVENTORY - ALL INGREDIENTS ARE LISTED
EPA CWA 40CFR PART 117 SUBSTANCE(RQ IN A SINGLE CONTAINER): NONE

ZEP MANUFACTURING COMPANY
FIRST IN MAINTENANCE PRODUCTS

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 X-10981
SUPERSEDES: 08/13/86 PRODUCT NUMBER: 2828

SECTION I - EMERGENCY CONTACTS

ZEP MANUFACTURING COMPANY
P.O. BOX 2015
ATLANTA, GEORGIA 30301
TELEPHONE (404)352-1680
BETWEEN 8:00A.M.-5:00P.M.
(EASTERN TIME ZONE)

NON-OFFICE HOURS, WEEKENDS, AND HOLIDAYS: AREA CODE 404
435-2973, 996-0899, 252-1587, 351-2952, 445-9226
LOCAL POISON CONTROL CENTER .....
TRANSPORTATION EMERGENCY
CHEMTREC: TOLL FREE 1-800-424-9300 ALL CALLS RECORDED
DISTRICT OF COLUMBIA (202)483-7616 ALL CALLS RECORDED

SECTION II - HAZARDOUS INGREDIENTS

DESIGNATIONS	TLV (PPM)	EFFECTS (SEE REVERSE)	% IN PROD.
** LOW ODOR PARAFFINIC SOLVENT ** odorless base oil; dispersol; CAS# 64742-47-8; RTECS# NONE; OSHA PEL 500 ppm.	500	CNS CBL	>90

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0389

Out 8/1/91

SPECIAL NOTE: ADVERSE HEALTH EFFECTS WOULD NOT BE EXPECTED UNDER RECOMMENDED CONDITIONS OF USE SO LONG AS PRESCRIBED SAFETY PRECAUTIONS ARE PRACTICED.

SECTION III - HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE:
THIS PRODUCT IS NOT SUFFICIENTLY VOLATILE TO CONSTITUTE A SIGNIFICANT IHALATION HAZARD. SEVERE OVER-EXPOSURE TO CONCENTRATED VAPOR MAY PRODUCE MILD CENTRAL NERVOUS SYSTEM DEPRESSION, CHARACTERIZED BY HEADACHE AND STUPOR. INTRODUCTION OF S[illegible]ENTS, AS IN ASPIRATION OF VOMITUS FLUIDS, MAY PRODUCE CHEMICAL PNEUMONIA. INHALATION MAY PRODUCE UPPER RESPIRATORY IRRITATION CHARACTERIZED BY SORE THROAT OR DIFFICULTY IN BREATHING.
THIS PRODUCT CAN BE AN EYE IRRITANT. INFLAMMATION OF EYE TISSUE IS CHARACTERIZED BY REDNESS, WATERING, AND/OR ITCHING.

ZEP MANUFACTURING COMPANY
FIRST IN MAINTENANCE PRODUCTS

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 X-10981
SUPERSEDES: 08/13/86 PRODUCT NUMBER: 2828

ECTION III - H E A L T H H A Z A R D D A T A (CONTINUED)

HRONIC EFFECTS OF OVEREXPOSURE:
ONTACT, ESPECIALLY IF PROLONGED OF REPEATED, MAY CAUSE REDDNESS, ITCHING, OR
LISTERING OF THE SKIN.
ONE OF THE HAZARDOUS INGREDIENTS ARE LISTED AS CARCINOGENS BY IARC, NTP, & OSHA

ST'D PEL/TLV: 500 PPM PRIMARY ROUTES OF ENTRY: INH, SKIN.

MIS CODES: HEALTH 1; FLAM. 2; REACT. 0; PERS. PROTECT. B ; CHRONIC HAZ. NO

IRST AID PROCEDURES:
KIN : WASH CONTAMINATED SKIN THROUGHLY WITH SOAP OR A MILD DETERGENT. APPLY A SKIN CREAM WITH LANOLIN. GET MEDICAL ATTENTION IF IRRITATION PERSISTS.
YES : IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, OCCASIONALLY LIFTING UPPER AND LOWER LIDS. GET MEDICAL ATTENTION AT ONCE.
NHALE: MOVE EXPOSED PERSON TO FRESH AIR. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION PROMPTLY.
NG T: IF SWALLOWED, DO NOT INDUCE VOMITING. IF VOMITING OCCURS, KEEP HEAD BELOW HIP LEVEL. GET EMERGENCY MEDICAL ATTENTION IMMEDIATELY.

ECTION IV - S P E C I A L P R O T E C T I O N I N F O R M A T I O N

ROTECTIVE CLOTHING : WEAR NEOPRENE, NITRILE, OR NATURAL RUBBER GLOVES OR GLOVES WITH PROVEN RESISTANCE TO THE INGREDIENTS LISTED.
'YE PROTECTION : USE OF TIGHT-FITTING SAFETY GLASSES OR GOGGLES IS STRONGLY RECOMMENDED, ESPECIALLY WHEN WEARING CONTACT LENSES.
'ESPIRATORY PROTECTION: IF VENTILATION IS INADEQUATE, WEAR A PROPERLY FITTING MSA OR OSHA-APPROVED RESPIRATOR.
'ENTILATION : VENTILATION SHOULD BE EQUIVALENT TO OUTDOORS. USE EXHAUST FANS AND OPEN WINDOWS IN ENCLOSED SPACES.

ECTION V - P H Y S I C A L D A T A

OILING POINT (F)	: 370-518	SPECIFIC GRAVITY	: 0.606
APOR PRESSURE(MMHG)	: 0.13 @ 70F	PERCENT VOLATILE BY VOLUME (%)	: 99.5
APOR DENSITY(AIR=1)	: 6.3	EVAPORATION RATE(=1)	: N/D
OLUBILITY IN WATER	: NEGLIGIBLE	PH(CONCENTRATE)	: N/A
		PH(USE DILUTION OF N/A)	: N/A

APPEARANCE AND ODOR : CLEAR BLUE WITH A MILD HYDROCARBON SOLVENT ODOR.

ECTION VI - F I R E A N D E X P L O S I O N D A T A

FL/ POINT(F) (METHOD USED): 153 (TCC)
FLAMMABLE LIMITS LEL 1.2 UEL 6
EXTINGUISHING MEDIA : CARBON DIOXIDE, FOAM, DRY CHEMICAL
SPECIAL FIRE FIGHTING: FIRE EXPOSED DRUMS SHOULD BE COOLED WITH STREAM OF WATER.
UNUSUAL FIRE HAZARDS : NONE EXPECTED

MATERIAL SAFETY DATA SHEET

AND SAFE HANDLING AND DISPOSAL INFORMATION

DATE : 07/09/89 X-10981
SUPERSEDES: 08/13/86 PRODUCT NUMBER: 2828

SECTION VII - REACTIVITY DATA

STABILITY : STABLE
INCOMPATIBILITY(AVOID) : HEAT, OPEN FLAME, SPARK, AND OXIDIZING AGENTS
POLYMERIZATION : WILL NOT OCCUR
HAZARDOUS DECOMPOSITION: CARBON DIOXIDE AND CARBON MONOXIDE

SECTION VIII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
IMMEDIATELY ELIMINATE ALL FLAME, IGNITION AND HIGH-HEAT SOURCES. ABSORB SPILL ON INERT ABSORBENT MATERIAL (eg ZEP-O-ZORB). PICK UP AND PLACE RESIDUE IN A CLEAN, D.O.T. SPECIFICATION CONTAINER FOR DISPOSAL. WASH AREA THOROUGHLY WITH A DETERGENT SOLUTION AND RINSE WELL WITH WATER.

WASTE DISPOSAL METHOD:
LIQUID WASTES ARE NOT PERMITTED IN LANDFILLS. PRODUCT IS NOT CONSIDERED A HAZARDOUS WASTE UNDER RCRA. UNUSABLE LIQUID MAY BE ABSORBED ON AN INERT ABSORBENT (e.g. ZEP-O-ZORB), DRUMMED AND TAKEN TO A CHEMICAL OR INDUSTRIAL LANDFILL. PRETREATMENT MAY BE REQUIRED BEFORE LANDFILLING. CONSULT LOCAL, STATE, OR FEDERAL AGENCIES FOR PROPER DISPOSAL IN YOUR AREA.

RCRA HAZ. WASTE NOS.: N/A

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN WHEN HANDLING AND STORING:
COMBUSTIBLE! STORE AND USE AWAY FROM HEAT, SPARKS, OPEN FLAME, OR ANY SOURCE OF IGNITION.
POST "NO SMOKING" SIGNS ACCORDING TO LOCAL REGULATIONS FOR COMBUSTIBLE LIQUIDS.
CLOSE CONTAINER TIGHTLY WHEN NOT IN USE. STORE AWAY FROM SUN AND HEAT.
DO NOT BREATHE SPRAY MISTS OR VAPORS.
AVOID PROLONGED CONTACT WITH SKIN.
CLOTHING OR SHOES WHICH BECOME CONTAMINATED WITH SUBSTANCE SHOULD BE REMOVED PROMPTLY AND NOT REWORN UNTIL THOROUGHLY CLEANED.
VAPORS ARE HEAVIER THAN AIR AND WILL ACCUMULATE AT LOW POINTS. VENTILATION SHOULD INCLUDE FLOOR LEVEL EXHAUSTING.

SECTION X - TRANSPORTATION DATA

DOT PROPER SHIPPING NAME
NONE
DOT HAZARD CLASS: N/A
DOT I.D. NUMBER : N/A DOT LABEL/PLACARD: NONE
EPA TSCA CHEMICAL INVENTORY - ALL INGREDIENTS ARE LISTED
EPA CWA 40CFR PART 117 SUBSTANCE(RQ IN A SINGLE CONTAINER): NONE

COMBUSTION ENGINEERING

CERRO COPPER PRODUCTS COMPANY
MSDS NUMBER - CCPC-00-0395

owk 8/1/91

CER-MAX™ BLU-RAM SHAPES W/SS FIBERS 0395

COMBUSTION ENGINEERING, INC.
CORPORATE HEALTH & SAFETY
WINDSOR, CT
Phone: (203) 285-9693

MANUFACTURER: C-E Refractories
ADDRESS: P. O. Box 828
Valley Forge, PA 19482
Phone: (215) 337-1100

SECTION I, MATERIAL IDENTIFICATION

Material Name	CER-MAX™ BLU-RAM SHAPES W/SS FIBER
CAS Registry #	Not Applicable
Chemical Composition	Al_2O_3, SiO_2, Fe_2O_3, TiO_2, P_2O_3, Na_2O, CaO, MgO, Alkalies

SECTION II, INGREDIENTS AND HAZARDS

CER-MAX™ BLU-RAM SHAPES are manufactured with Blue Ram mix using the SXD process. This product contains less than 5% phosphoric acid, stainless steel needles and in its current state 1% to 2% crystalline silica (free silica).

The current OSHA Permissible Exposure Limit (PEL) for airborne phosphoric acid is 1 mg/m^3.

The current OSHA Permissible Exposure Limit (PEL) for respirable crystalline silica dust is 10 mg/m^3 divided by percent free silica plus two, averaged over an 8 hours workshift.

When this product is removed after its useful life (tear out) dust generation is likely. The user should be warned of the current PEL and precautions should be taken to avoid inhalation of dust. Refer to Section VI for applicable Health Hazard information and Section IX for Special Precautions and Comments.

This product does not contain any substances listed in the National Toxicology Program "Annual Report on Carcinogens" (1983) nor the International Agency for Research on Cancer Monographs, nor by OSHA.

SECTION III, PHYSICAL DATA

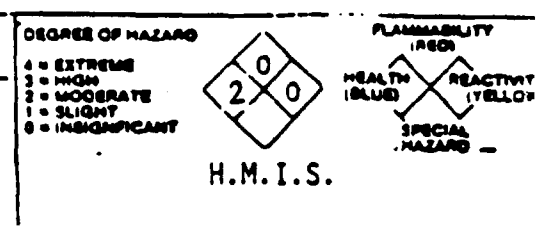
Appearance and odor: Blue block shapes containing stainless steel needles.

SECTION IV, FIRE AND EXPLOSION DATA

This product is a non-combustible refractory. Use extinguishing media appropriate to the surrounding area.

SECTION V, REACTIVITY DATA

This material is stable.



SECTION VI, HEALTH HAZARD DATA

Removal After Service Precautions: Chronic health hazards can occur from long term excessive inhalation of crystalline silica dust. Crystalline silica in the lungs can produce a pheumonconiosis, commonly called silicosis, which is a slowly developing disease. Symptoms are usually delayed (10 years or more). Smoking can increase the risk of injury.

SECTION VII, SPILL, LEAK AND DISPOSAL

DISPOSAL: Non-Biodegradable - Use solid waste disposal common to landfill type operation or similar disposal.

SECTION VIII, SPECIAL PROTECTION INFORMATION

Heavy work gloves are recommended for handling and removal from service.

SECTION IX, SPECIAL PRECAUTIONS AND COMMENTS

REMOVAL PRECAUTIONS:
Because of the possible presence of crystalline silica in used refractory linings, particular care should be exercised during tear-out to minimize the generation of dust. Adherence to proper methods of dust suppression and control is imperative. Following are recommended precautions to be taken during removal:

1. EMPLOYEES SHOULD BE APPRISED OF THE HAZARDS AND PROPER CONDITIONS AND PRECAUTIONS FOR SAFE USE OR EXPOSURE.
2. NIOSH approved respirators should be used for dust levels below 50 mg/cu.m.
3. Dust generation should be minimized by use of dust control equipment or water spray.
4. Wear protective clothing and vacuum clean prior to removing clothing.
5. Where there is a possibility of exposure to dust containing crystalline silica, the following warning should be posted in a readily visible location:

   WARNING:
   FREE SILICA WORK AREA
   AVOID BREATHING DUST
   MAY CAUSE DELAYED LUNG INJURY, (SILICOSIS)

DATE PREPARED: 8/87
REVISED:
PRODUCT #:

MATERIAL SAFETY DATA SHE

CERRO COPPER PRODUCTS COMPAN
MSDS NUMBER - COPC-00-0404

OUT 8/1/91

DATE MAY 15, 1986

SECTION I

MANUFACTURER'S NAME: ZYP COATINGS, INC.	EMERGENCY TELEPHONE NO.: (615) 482-5717
ADDRESS: P.O. BOX 208, OAK RIDGE, TN 37831	
CHEMICAL NAME AND SYNONYMS: BORON NITRIDE	TRADE NAME AND SYNONYMS: BORON NITRIDE LUBRICOAT
CHEMICAL FAMILY: METAL NITRIDE	FORMULA: BN IN PAINT FORM

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (mg M^3)		%	TLV (mg/M^3)
PIGMENTS BORON NITRIDE	25	5			
VEHICLE WATER*	70	NA			
HYDRATED ALUMINA	5	10			

* WATER IS ACIDIFIED USING NITRIC ACID (HNO_3) AT A 3% CONCENTRATION.

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	NE	SPECIFIC GRAVITY (H_2O=1)	1.19
VAPOR PRESSURE (mm Hg.)	NE	PERCENT VOLATILE BY WEIGHT (%)	70
VAPOR DENSITY (AIR=1)	>1	EVAPORATION RATE: LESS THAN WATER	
SOLUBILITY IN WATER: DILUTABLE		STATE: LIQUID	
APPEARANCE AND ODOR: WHITE/NEARLY ODORLESS			

SECTION IV - FIRE, EXPLOSION & REACTIVITY HAZARD DATA

FLASH POINT (Method used): NOT FLAMMABLE			
EXTINGUISHING MEDIA: NOT FLAMMABLE			
SPECIAL FIRE FIGHTING PROCEDURES: NONE			
UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE			
STABILITY	UNSTABLE		CONDITIONS TO AVOID: NONE KNOWN
	STABLE	XX	
INCOMPATABILITY (Materials to avoid): MATERIALS HIGHLY SENSITIVE TO ACIDIC SOLUTIONS.			
HAZARDOUS DECOMPOSITION PRODUCTS: ON FIRST HEATING TO 600 C, H_2O AND NO_x ARE EMITTED IN SMALL QUANTITIES.			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID: NONE KNOWN
	WILL NOT OCCUR	XX	

(Continued on reverse side)

SECTION V - HEALTH HAZARD DATA

ROUTES OF ENTRY: INGESTION INHALATION

CARCINOGENIC: NO

THRESHOLD LIMIT VALUE: NOT ESTABLISHED

EFFECTS OF OVEREXPOSURE: MILD SKIN IRRITATION WITH CONTINUED EXPOSURE. IRRITATION OR INJURY TO RESPIRATORY TRACT. BURNING IN MOUTH, ABDOMINAL PAIN. SEVERE EXPOSURE TO BN DUST MAY PRODUCE PNEUMOCONIOSIS. MAY CAUSE EYE DAMAGE. MILDLY ACIDIC, pH=2 to 3.

EMERGENCY AND FIRST AID PROCEDURES: FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND WASH CONTAMINATED AREAS OF THE BODY WITH SOAP AND WATER. IF INGESTED, GIVE FLUIDS IN LARGE QUANTITIES. IF INHALED, REMOVE TO FRESH AIR AND TREAT SYMPTOMS. IF INGESTED OR INHALED, SEEK PROMPT MEDICAL ATTENTION.

SECTION VI - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: CONTAIN, ABSORB ONTO A NON-FLAMMABLE ABSORBANT MATERIAL AND DISPOSE OF AS DIRECTED BELOW.

WASTE DISPOSAL METHOD: CONSULT LOCAL, STATE AND FEDERAL REGULATIONS. THIS MATERIAL IN LIQUID FORM IS MILDLY ACIDIC, pH=2 to 3.

SECTION VII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type): IF SPRAYED, USE MSHA/NIOSH APPROVED RESPIRATOR.

VENTILATION:
- LOCAL EXHAUST: NORMAL ROOM VENTILATION
- MECHANICAL (General): IF SPRAYED USE APPROVED SPRAY BOOTH
- SPECIAL:
- OTHER:

PROTECTIVE GLOVES: RUBBER

EYE PROTECTION: GOGGLES

OTHER PROTECTIVE EQUIPMENT: PROTECTIVE CLOTHING

SECTION VIII - SPECIAL PRECAUTIONS FOR SAFE HANDLING

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: STORE IN ORIGINAL CONTAINER. AVOID USE OF MATERIALS OR EQUIPMENT SENSITIVE OR REACTIVE WITH ACIDIC SOLUTIONS.

OTHER PRECAUTIONS: WHEN DRIED AND UNDER DUSTING CONDITIONS, NOTE EFFECT OF OVER-EXPOSURE WITH BORON NITRIDE CONTAINING PRODUCTS CITED ABOVE.

MATERIAL SAFETY DATA SH

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

PRODUCT NAME: LIQUIDOW (R) 30-42% CALCIUM CHLORIDE SOLUTION

Effective Date: 02/05/90 Date Printed: 03/09/90 MSDS:001274

1. INGREDIENTS: (% w/w, unless otherwise noted)

Calcium chloride	CAS# 010043-52-4	30-42%
Potassium chloride	CAS# 007447-40-7	1-3%
Sodium chloride	CAS# 007647-14-5	1-2%
Water	CAS# 007732-18-5	BAL.

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: 230-251F, 110-122C
VAP PRESS: 7-15 mmHg @ 25C, 77F
VAP DENSITY: Same as water.
SOL. IN WATER: Completely miscible
SP. GRAVITY: 1.297-1.437 @ 25C, 77F
APPEARANCE: Clear to straw liquid solution.
ODOR: None.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: Not applicable
METHOD USED: Not applicable

FLAMMABLE LIMITS
LFL: Not applicable
UFL: Not applicable

EXTINGUISHING MEDIA: Non-combustible.

FIRE & EXPLOSION HAZARDS: None.

(Continued on Page 2)
(R) Indicates a Trademark of The Dow Chemical Company

* An Operating Unit of The Dow Chemical Company

3. FIRE AND EXPLOSION HAZARD DATA: (CONTINUED)

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID)

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Calcium chloride will: corrode most metals exposed to air; attack aluminum (and its alloys) and yellow brass; react with sulfuric acid to form hydrogen chloride which is corrosive, irritating, and reactive; give an exothermic reaction with water-reactive materials such as sodium; result in a runaway polymerization reaction with methyl vinyl ether (Bretherick, 1979); and, in solution form react with zinc (galvanizing) to yield hydrogen gas which is explosive (Ibid). (Bretherick, L., 1979, Handbook of Reactive Chemical Hazards, 2nd Ed.).

HAZARDOUS DECOMPOSITION PRODUCTS: Not applicable.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Losses incidental to correct applications of this product in its intended uses are not expected to be harmful to the environment. Wear appropriate safety apparel during cleanup -- see Section 8. Contain by diking, etc. Avoid entry of large amount of product into sewers, natural waters, and drinking water sources. Due to possible harmful effects, avoid contact with vegetation, animals, and fish life. Recover quickly into suitable containers if reusing; or collect using absorbent material or sand. Small quantities may be flushed away with plenty of water. Walking surfaces may remain wet longer due to moisture

(Continued on Page 3)

5. ENVIRONMENTAL AND DISPOSAL INFORMATION: (CONTINUED)

being held by spilled product -- avoid by thoroughly water washing surfaces.

DISPOSAL METHOD: Comply with federal state, and local laws; regulations, and procedures. Contact manufacturer and authorities for detailed information. Product as sold is not a RCRA listed or characteristic hazardous waste.

6. HEALTH HAZARD DATA:

EYE: May cause moderate to severe eye irritation with corneal injury, which may be slow to heal. Material is sometimes encountered at elevated temperatures; more intense effects as well as thermal burns are possible.

SKIN CONTACT: Short single exposure not likely to cause significant skin irritation. Prolonged or repeated exposure may cause skin irritation, even a burn. May cause more severe response if confined to skin or skin is abraded (scratched or cut). Material is sometimes encountered at elevated temperatures; more intense effects as well as thermal burns are possible. DOT Classification: Non-corrosive.

SKIN ABSORPTION: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The LD50 for skin absorption in rabbits is >5000 mg/kg for CaCl2.

INGESTION: Single dose oral toxicity is believed to be low. The oral LD50 for rats is in the range of 900-2100 mg/kg for calcium chloride on a 100% basis. Ingestion may cause gastrointestinal irritation or ulceration.

INHALATION: Vapors are unlikely due to physical properties. Mists may cause irritation to upper respiratory tract.

SYSTEMIC & OTHER EFFECTS: The components of this product are not

(Continued on Page 4)

6. HEALTH HAZARD DATA: (CONTINUED)

listed by IARC, NTP, or OSHA as a carcinogen for hazard communication purposes. Results of in vitro mutagenicity tests have been negative for CaCl2.

7. FIRST AID:

EYES: Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

SKIN: Wash off in flowing water or shower.

INGESTION: If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Call a physician. (Never give anything by mouth or attempt to induce vomiting in an unconscious person.)

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): Dow IHG is 10 mg/m3 for calcium chloride, sodium chloride, and potassium chloride. There is no OSHA PEL or ACGIH TLV for calcium chloride.

VENTILATION: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying

(Continued on Page 5)

8. HANDLING PRECAUTIONS: (CONTINUED)

respirator.

SKIN PROTECTION: For brief contact, no precautions other than clean body-covering clothing should be needed. Use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron, or full-body suit will depend on operation. If skin comes in contact with contaminated clothing, remove the clothing immediately, wash skin area with soap and water, and launder clothing before reuse.

EYE PROTECTION: Use chemical goggles. Eye wash fountain should be located in immediate work area.

9. ADDITIONAL INFORMATION:

REGULATORY REQUIREMENTS:

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard (due to skin and eye effects).

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Product may sometimes be shipped hot, which may cause thermal burns and probable more intense chemical irritation or burn than at ambient temperatures. Avoid eye and prolonged skin contact. ALWAYS USE COOL WATER (TEMPERATURE LESS THAN 80F, 27C) WHEN DILUTING CALCIUM CHLORIDE SOLUTION. HEAT DEVELOPED BY SOLUTIONS IS VERY HIGH DURING MIXING. Leather clothing and shoes will be damaged by calcium chloride.

MSDS STATUS: Revised Section 4.

(Continued on Page 6)

Mogul A-421 (Discontinued) Removed 9216 6/91

The Mogul Corporation

CHAGRIN FALLS, OHIO 44022 • (216) 247 5000 • TELEX NUMBER 98 0324

MATERIAL SAFETY DATA SHEET

SECTION I

CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS
None: Proprietary Microbiocidal Treatment	MOGUL A-421
CHEMICAL FAMILY	**FORMULA**
	Composition

SECTION II - HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Sodium pentachlorophenate	79	
Sodium salts of other chlorophenols	11	

SECTION III - PHYSICAL DATA

BOILING POINT (°F)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR = 1)		EVAPORATION RATE (_____ = 1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR	Small, tan, free-flowing bead;		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)	N/A	FLAMMABLE LIMITS	N/A	Lel	Uel

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARDS

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: None established.

EFFECTS OF OVEREXPOSURE: Corrosive: Causes eye damage and skin irritation. Harmful or fatal if swallowed.

EMERGENCY AND FIRST AID PROCEDURES

Skin: Wash with soap and plenty of water. Eyes: Flush immediately with water.

Internal: Induce vomiting immediately. CONSULT PHYSICIAN for eye contact, ingestion, or if an irritation persists.

(Continued on reverse side)

The Mogul Corporation

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Oxidizing materials
INCOMPATABILITY (Materials to avoid)			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep up and remove. Swept area may be flushed with water. MOGUL A-421 is toxic to fish. DO NOT DISCHARGE TO NATURAL WATERWAYS, [illegible] IN ACCORDANCE [illegible] PERMIT.

WASTE DISPOSAL METHOD

Send to an approved landfill, or contact a scavenger.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

Usually not required.

VENTILATION	LOCAL EXHAUST: Recommended in confined spaces.	SPECIAL
	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES: Rubber	EYE PROTECTION: Chemical safety goggles or face shield.

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid eye and skin contact. Do not take internally. Avoid inhaling dusts. Store in a cool, dry area. Avoid contact with incompatible materials. Keep container closed when not in use. Wash thoroughly after handling.

OTHER PRECAUTIONS

Do not reuse empty container. Read and follow label directions.

TOTAL WATER MOGUL MANAGEMENT

THE MOGUL CORPORATION

WATER TREATMENT PRODUCTS AND SERVICES SINCE 1915

P. O. BOX 200 • CHAGRIN FALLS, OHIO 44022 • (216) 247-5000 • TELEX NUMBER 985-626

August 18, 1986

Mr. F. Baker Ottofy III
Cerro Copper Products Company
P. O. Box 681
East St. Louis, IL 62202

Dear Mr. Ottofy:

In response to your recent request, enclosed is/are Material Safety Data Sheet(s) for the following Mogul products:

A-421	----	Discontinued
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----------		----------
----------		----------

Thank you for your continued use of Mogul products. We will be pleased to respond to any questions you may have concerning these safety data sheets or the safe handling of our product(s).

Sincerely,

Evelyn Wiant

Evelyn Wiant
Secretary - Safety/Regulatory

Enclosures

cc: S. J. McKenzie
J. A. Spacek

ULTRA SONIC CLEANER #2

G. S. ROBINS & CO.
CHEMICALS WITH SERVICE
126 Chouteau St. Louis, Mo. 63102
(314) 621-5155

MATERIAL SAFETY DATA SHEET

Product Name

PRODUCT IDENTIFICATION

ULTRA SONIC CLEANER #2

Synonyms: None

DOT Proper Shipping Name: N/A

DOT Hazard Class/ I.D. No.: N/A

Label Requirements: N/A

U.S. Surface Freight Classification: N/A

HAZARDOUS INGREDIENTS

COMPONENT	%	HAZARD DATA
Water	Balance	
Disodium Salt	2-3%	
Surfactant	3-4%	
Sodium Hydroxide	Under 1%	$2M/M^3$
Trisodium NTA	Under 3.5%	

WARNING STATEMENTS

Wash thoroughly after handling. Keep from freezing. Keep out of reach of children.

PRECAUTIONARY MEASURES

Use good personal hygiene practices. Where gross eye/skin contact may be a problem, wear or use appropriate protective equipment. Do not let material remain in contact with skin.

EMERGENCY AND FIRST AID PROCEDURES

If in eyes, immediately flush with plenty of water. Call a physician if irritation persists.

If on skin, immediately flush with plenty of water. Wash clothing before re-use.

-- inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Caution- Eye Irritant. Avoid contact. Chemical workers use splash-proof goggles where eye contact may be a problem.

Skin Protection: If prolonged or repeated contact is possible:
Rubber, PVC or other impervious material.

Respiratory Protection: No special requirements under normal use conditions. If mists/ vapors are not adequately controlled by local ventilation, use appropriate respiratory protection.

ɔntilation: General room ventilation is normally adequate.
Substantial amounts of mists/ vapors can be controlled with local exhaust ventalation or respiratory protection.

Airborne Exposure Limits: N/A

FIRE PROTECTION INFORMATION

Flash Point: N/A

Auto Ignition Temperature: N/A

Flammable Limits in Air, % by Vol. @ 212°F: N/A

Extinguishing Media: Foam, CO_2, Dry Chemical, Water Fog.

'nusual Fire And Explosion Hazards: Corrosive material. Container may burst in heat.

Special Firefighting Procedures Use standard approved fire fighting procedures. Keep product cool . Use caution when approaching or handling fire exposed containers.

REACTIVITY DATA

Materials to Avoid: None

Hazardous Decomposition Products: N/A

PHYSIOLOGICAL EFFECTS SUMMARY

PHYSICAL DATA

Appearance: Clear-white liquid, mild odor.

Specific Gravity @ 20°C/4°C: 1.080 at 77° F.

Boiling Point @ 760 mm Hg: Above 20°C

Vapor Pressure @ N/A

Vapor Density (Air = 1): N/A

Percent Volatile by Volume: N/A

SPILL, LEAK & DISPOSAL INFORMATION

Waste Disposal: Dispose of in accordance with all local state and federal regulations. Disposal by incineration in an approved incinerator is recommended.

Spill or Leakage Procedures: Contain spilled material and absorb with clay, saw dust or other absorbent material. Place all spilled material, contaminated sorbent materials, contaminated dirt, and other contaminated material in drums.
Keep material out of watersheds and water systems.

OTHER REGULATORY REQUIREMENTS

Based upon ingestion of NTA in lifetime feeding studies. NTA has been shown to induce tumors in the urinary tracts of rats and mice. Nitrilotriacetic acid , in a National Toxicology Program listed carcinogen and is identified as a hazardous chemical, under criteria of OSHA Hazard Communication Standard (29CFR 1910.1200).

WRITTEN BY: Lee Tempel
REVISION DATE: 9-30087

~~COME CLEAN~~ ~~BN 200~~ Ultrasonic Clean. Fluid

Johnson wax

SMITH & KLEBES, INC.
411 JOHN DOWNEY DRIVE
NEW BRITAIN, CONN. 06051

S.C. Johnson & Son, Inc.
Racine, Wisconsin 53403-5011
Phone: (414) 631-2777

No longer used.

MATERIAL SAFETY DATA SHEET

SECTION I — PRODUCT IDENTIFICATION

Product Name:	Product Code:
COME CLEAN	18210-006

Chemical or Common Name:	Date Issued:	Supercedes:	Prepared by:
NA	07/24/85	04/12/85	Gordon B. Bradshaw Materials Data Coordinator

SECTION II — INGREDIENT INFORMATION

	Weight %	Exposure Limit
Alkali Metasilicates and Carbonates	5-10	
Sodium Hydroxide (CAS #1310-73-2)	1-3	2 mg\m3
Trisodium NTA (CAS #5064-31-3) (NTP Listed - See Section X)	1-3	
Surfactants	4-6	
Formaldehyde (CAS# 50-00-0)	under 0.1	2 ppm (ceiling)
Colorant	under 0.1	
Water	balance	

SECTION III — PHYSICAL DATA

Appearance/Odor:	Yellow-green liquid with mild odor	Specific Gravity (H_2O = 1):	1.2
Vapor Pressure (mm Hg.):	NA	Percent Volatile by Volume (%):	NA
Solubility in Water:	Complete	Vapor Density (Air = 1):	NA
Freezing Point (°F):	ND	Boiling Point (°F):	above 200
pH:	13 (Undiluted)	Evaporation Rate (Butyl Acetate = 1):	NA

SECTION IV — FIRE AND EXPLOSION INFORMATION

Flash Point (°F) (Method Used): NA

Flammable Limits: NA

Extinguishing Media: [X] Foam [X] CO_2 [X] Dry Chemical [X] Water Fog [ ] Other

Special Fire Fighting Procedures:
Normal fire fighting procedures may be used. Cool and use caution when approaching or handling fire-exposed containers.

Unusual Fire and Explosion Hazards:
Corrosive Material (See Sections VI, VIII). Container may burst in heat of fire.

R-106 (1) (Rev. 3 - 8-84)

SECTION VIII — SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify type): No special requirements under normal use conditions. If mists\vapors are not adequately controlled by local ventilation, use appropriate respiratory protection to prevent overexposures.

Ventilation: General room ventilation is normally adequate. Substantial amounts of mists\vapors can be controlled with local exhaust ventilation or respiratory protection.

Protective Gloves: If prolonged or repeated contact is possible: Rubber, PVC or other impervious material.

Eye Protection: Chemical workers splash-proof goggles where eye contact may be a problem.

Other Protective Measures: Use good personal hygiene practices. Where gross eye\skin contact may be a problem, wear\use appropriate protective equipment.

SECTION IX — SPECIAL PRECAUTIONS

Precautionary Labeling CAUTION: Eye irritant. Avoid contact with eyes. If eye contact occurs, flush with water. If irritation persists, contact physician. Avoid inhalation of product in spray application.
Keep out of reach of children. Keep from freezing. Store at temperatures between 40 F and 100 F. Keep container closed when not in use.

Other Handling and Storage Conditions

Wash thoroughly after handling. Keep from freezing. Keep out of reach of children.

SECTION X — ADDITIONAL INFORMATION

For information on appropriate emergency procedures phone: **(414) 631-2000.**

Based upon ingestion of NTA in lifetime feeding studies, NTA has been shown to induce tumors in the urinary tracts of rats and mice. However, on a practical basis and according to guidelines for classification of experimental animal carcinogens of the American Conference of Government Industrial Hygienists (ACGIH), NTA would not be considered an occupational carcinogen of any practical significance.

NA-Not Applicable, NSR-No Special Requirement, ND-Not Determined for this product

Mogul A-421

The Mogul Corporation

CHAGRIN FALLS, OHIO 44022 • (216) 247 5000 • TELEX NUMBER 98 0324

MATERIAL SAFETY DATA SHEET

DISCONTINUED

SECTION I

CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS
None: Proprietary Microbiocidal Treatment	MOGUL A-421
CHEMICAL FAMILY	FORMULA
	Composition

SECTION II - HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Sodium pentachlorophenate	79	
Sodium salts of other chlorophenols	11	

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR = 1)		EVAPORATION RATE (_____ = 1)	
SOLUBILITY IN WATER			

APPEARANCE AND ODOR: Small, tan, free-flowing bead.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)		FLAMMABLE LIMITS		Lel	Uel
	N/A		N/A		

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARDS

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: None established.

EFFECTS OF OVEREXPOSURE: Corrosive: Causes eye damage and skin irritation. Harmful or fatal if swallowed.

EMERGENCY AND FIRST AID PROCEDURES

Skin: Wash with soap and plenty of water. Eyes: Flush immediately with water.

Internal: Induce vomiting immediately. CONSULT PHYSICIAN for eye contact, ingestion, or if an irritation persists.

(Continued on reverse side)

The Mogul Corporation

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Oxidizing materials
INCOMPATABILITY (Materials to avoid)			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep up and remove. Swept area may be flushed with water. MOGUL A-421 is toxic to fish. DO NOT DISCHARGE TO NATURAL WATERWAYS.

WASTE DISPOSAL METHOD

Send to an approved landfill, or contact a scavenger.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

Usually not required.

VENTILATION	LOCAL EXHAUST: Recommended in confined spaces.	SPECIAL
	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES: Rubber	EYE PROTECTION: Chemical safety goggles or face shield.

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid eye and skin contact. Do not take internally. Avoid inhaling dusts. Store in a cool, dry area. Avoid contact with incompatible materials. Keep container closed when not in use. Wash thoroughly after handling.

OTHER PRECAUTIONS

Do not reuse empty container. Read and follow label directions.

THE MOGUL CORPORATION

WATER TREATMENT PRODUCTS AND SERVICES SINCE 1915

P. O. BOX 200 • CHAGRIN FALLS, OHIO 44022 • (216) 247-5000 • TELEX NUMBER 985-626

August 18, 1986

Mr. F. Baker Ottofy III
Cerro Copper Products Company
P. O. Box 681
East St. Louis, IL 62202

Dear Mr. Ottofy:

In response to your recent request, enclosed is/are Material Safety Data Sheet(s) for the following Mogul products:

A-421	----	Discontinued
----------		----------
----------		----------
----------		----------
----------		----------

Thank you for your continued use of Mogul products. We will be pleased to respond to any questions you may have concerning these safety data sheets or the safe handling of our product(s).

Sincerely,

Evelyn Wiant

Evelyn Wiant
Secretary - Safety/Regulatory

Enclosures

cc: S. J. McKenzie
J. A. Spacek

cc: WCC-1/29/91
LWE
DWC
WRW
FILE

1631210009
TWI
RCRA PERMIT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: April 29, 1991 5HR-13

SUBJECT: Activation of Emergency Vent Stack Openings and Automatic Waste Feed Cut Offs at TWI Incinerator

FROM: Y. J. Kim, National Incineration Expert
Waste Management Division

TO: Elizabeth Cotsworth, Chief
RCRA Assistance Branch (OS-343)

The following summarizes the latest data on the opening of the emergency vent stack and the activation of the emergency waste feed cut-off system for the TWI CWM Incinerator, Sauget, Illinois:

Emergency By-Pass Stack Openings

Period	Unit 1	Unit 2	Unit 3	Unit 4	
10/01-10/29/90	4	8	13	9	Kiln 6, SCC 3
10/29-11/26/90	4	19	1	3	Kiln 0, SCC 3
11/26-12/24/90	4	14	14	3	Kiln 1, SCC 2
12/24-1/21/91	1	5	6	0	Kiln 0, SCC 0
1/21-2/18/91	1	8	9	2	Kiln 1, SCC 1
2/18-3/18/91	3	5	3	1	Kiln 1, SCC 0
3/18-4/1/91 (2 wks)	0	2	2	0	Kiln 0, SCC 0
Total (6 months):	**17**	**61**	**48**	**18**	**Kiln 9, SCC 9**

Grand Total: 144 Openings (16.6% of previous 6-month openings.)

For Comparison:

(2/19/90-8/19/90: 67 356 313 131 - Previously Reported)
(Grand Total: 867 Openings - Previously Reported)

940900

Activation of Automatic Waste Feed Cut-Off System

Period	Unit 1	Unit 2	Unit 3	Unit 4
W.E. 10/8/90	57	1,032	601	19
W.E. 10/15/90	769	948	489	46
W.E. 10/22/90	393	788	664	55
W.E. 10/29/90	231	1,143	444	277
W.E. 11/5/90	528	842	650	1.412
W.E. 11/12/90	270	802	396	1,400
W.E. 11/19/90	327	726	685	676
W.E. 11/26/90	371	974	1,808	254
W.E. 12/3/90	230	1,162	1,175	41
W.E. 12/10/90	381	404	1,594	150
W.E. 12/17/90	341	298	1,457	123
W.E. 12/24/90	378	833	1,787	76
W.E. 12/31/90	272	332	1,320	27
W.E. 1/7/91	190	282	1,348	19
W.E. 1/14/91	406	631	1,099	29
W.E. 1/21/91	188	454	1,209	71
W.E. 1/28/91	271	6*	2,170	19
(* Unit 2 was shut down for 6.5 days for maintenance.)				
W.E. 2/4/91	195	813	1,640	22
W.E. 2/11/91	16*	1,297	2,087	98
(* Unit 1 was down for 6 days for repair.)				
W.E. 2/18/91	0*	1,252	1,647	13
(* Unit 1 shut down for repair for 6.5 days.)				
W.E. 2/25/91	173	1,048	1,697	0*
(* Unit 4 was shut down for maintenance for 7 days.)				
W.E. 3/4/91	339	555	1,536	28
W.E. 3/11/91	297	773	1,574	37
W.E. 3/18/91	171	1,175	1,815	87
W.E. 3/25/91	198	957	1,452	144
W.E. 4/1/91	190	651	686	151
Six-Month Total:	**7,182**	**20,178**	**33,030**	**5,274 - Total: 65,664**
Monthly Avg:	**1,197**	**3,363**	**5,505**	**879 - Total: 10,944**

For Comparison:

Previous Total for 30-day Ending 8/19/90: 13,325 ANFCO Activations.

Conclusion: No appreciable decrease in frequencies of ANFCOs.

RECOMMENDATIONS:

1. OSW should issue a policy memo endorsing the use of technology-based, good engineering practice requirements (technically demonstrated and economically feasible) in the RCRA incinerator permit, in order to prevent pollution and to protect worker safety, irrespective of availability of data to show their health impact. EPA should publically acknowledge the fact that it has not achieved the ability to totally assess the environmental impact of emissions resulting from such combustion upsets (high CO, high HC, low Oxygen, etc.).

2. The State of Illinois or Region V may initiate a suspension of the operation of TWI facility in the near future, unless the frequencies of AWFCOs and the bypass vent openings be reduced drastically from the current levels.

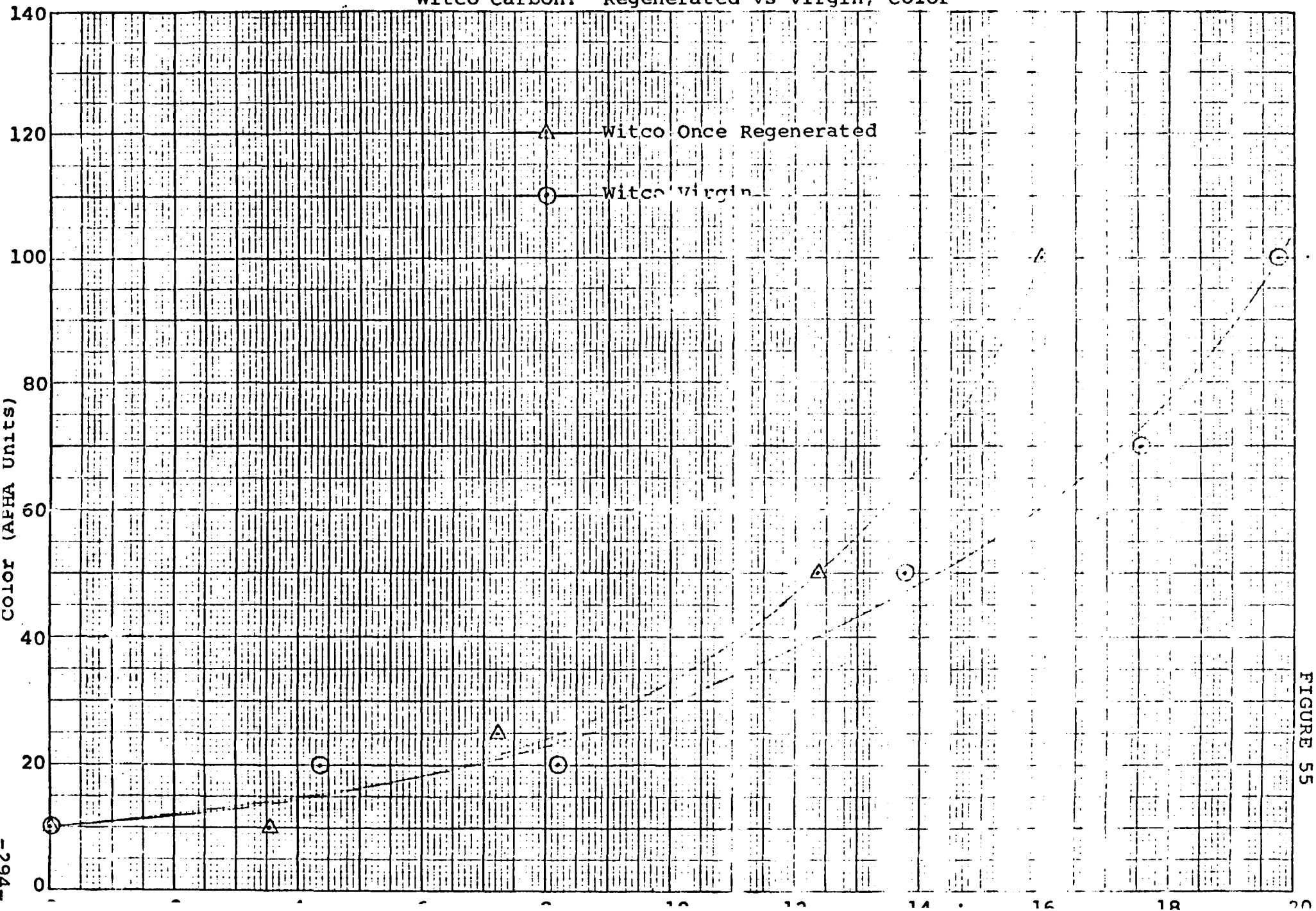


FIGURE 55

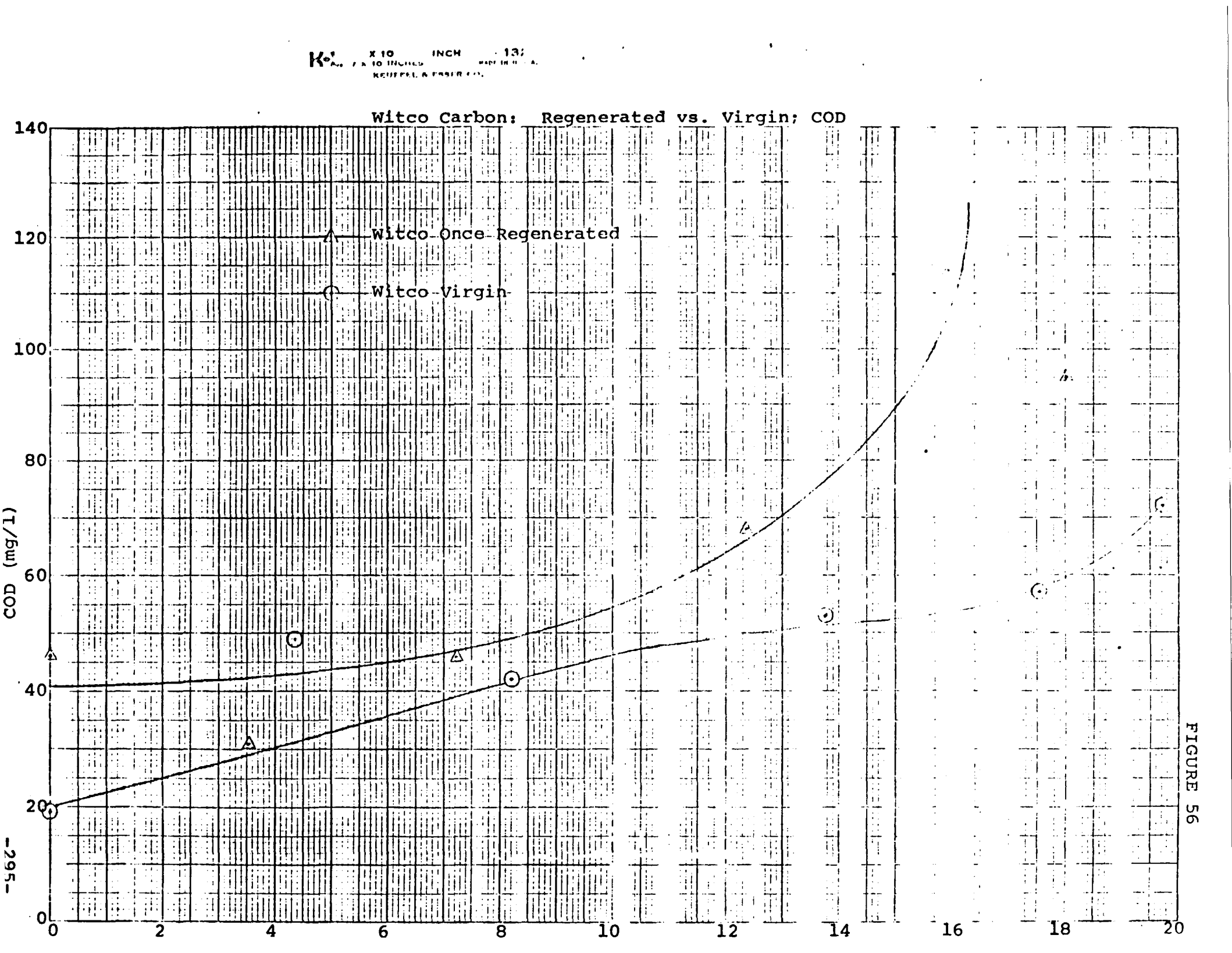

Witco Carbon: Regenerated vs. Virgin; COD
Witco Once Regenerated
Witco Virgin
COD (mg/l)
0
20
40
60
80
100
120
140
0
2
4
6
8
10
12
14
16
18
20

FIGURE 56

Darco Carbon: Virgin vs Regenerated vs Acid Washed Regenerated; Color

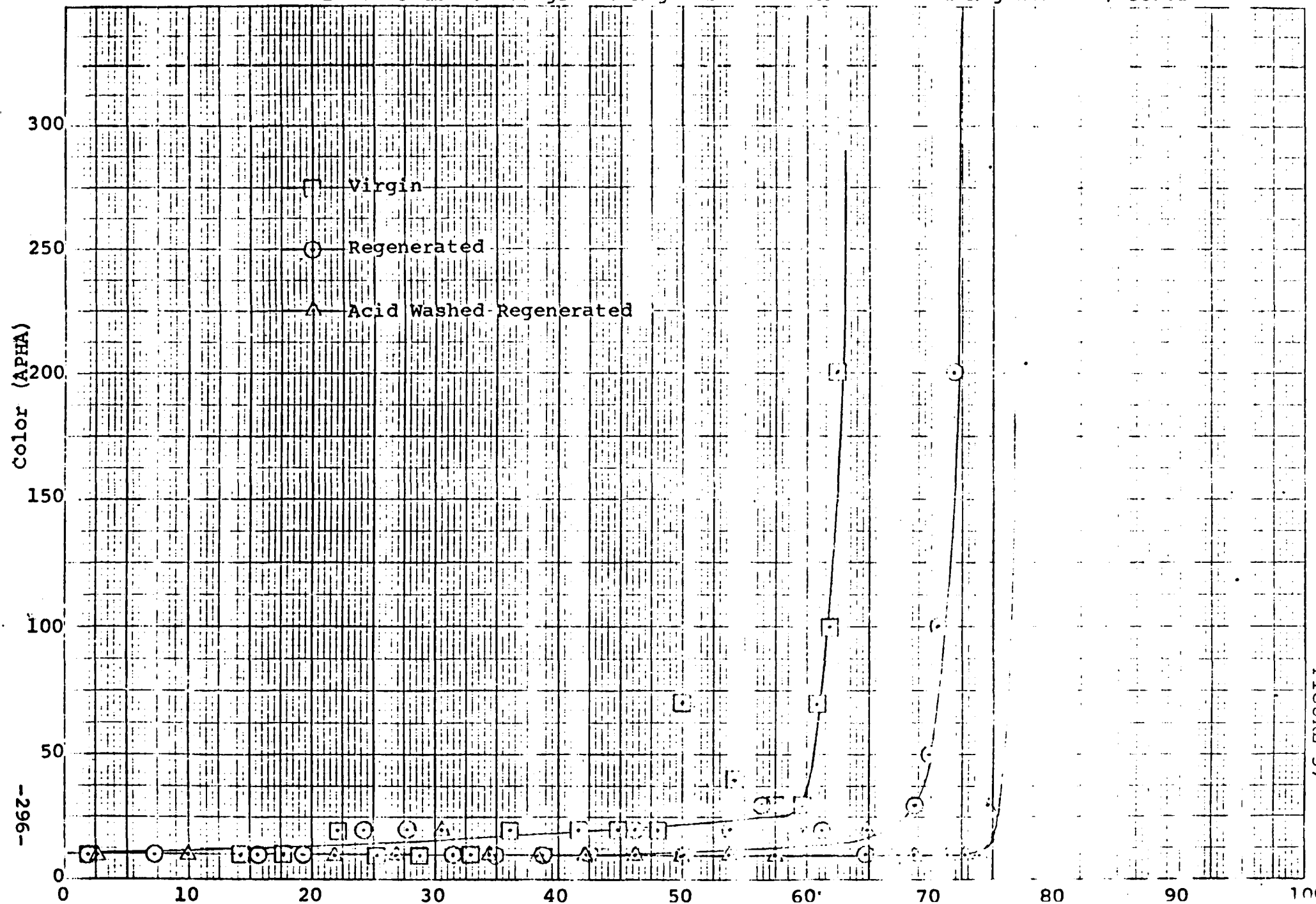


FIGURE 57

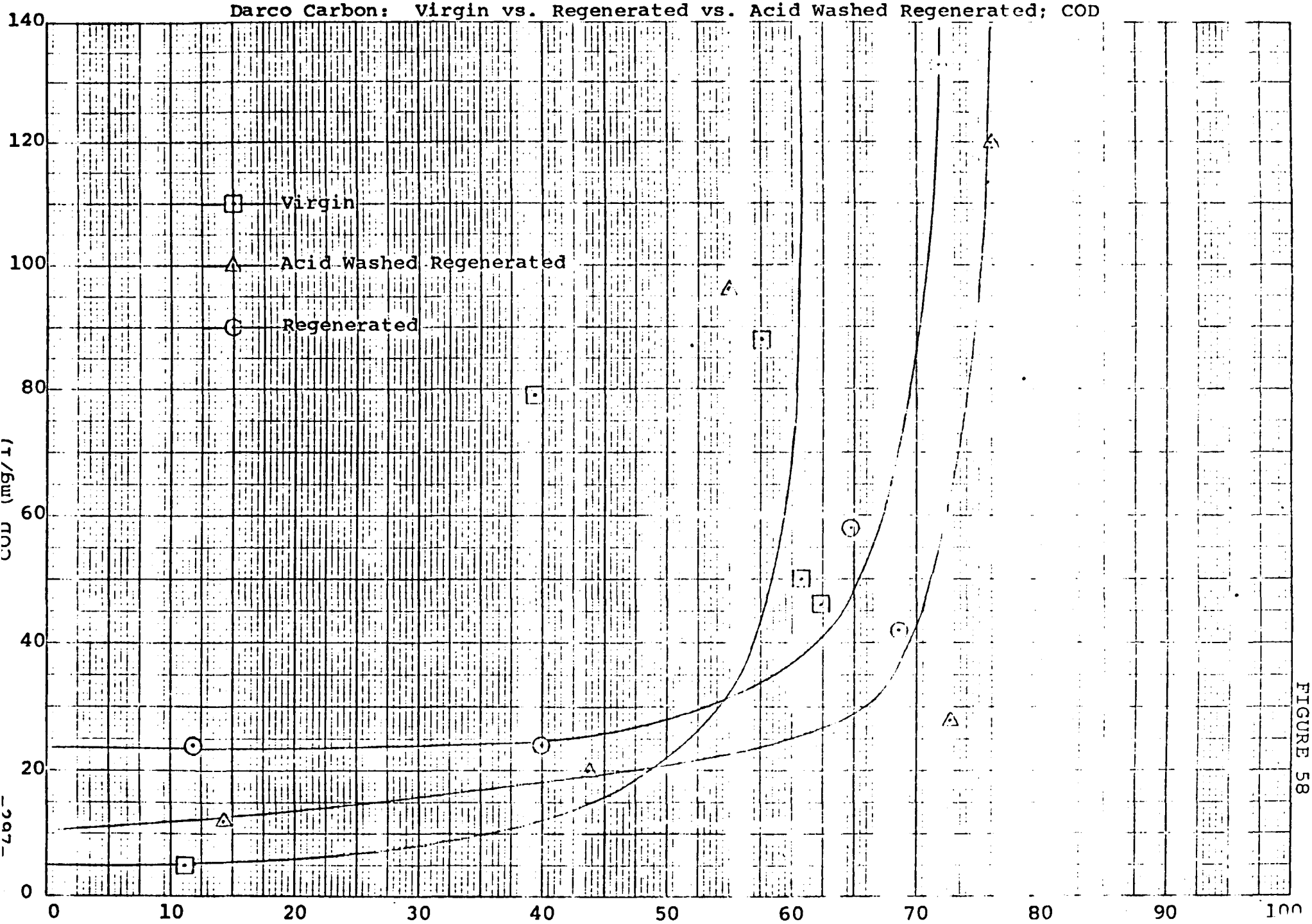


FIGURE 58

Darco Carbon: Regenerated vs. Virgin; Color

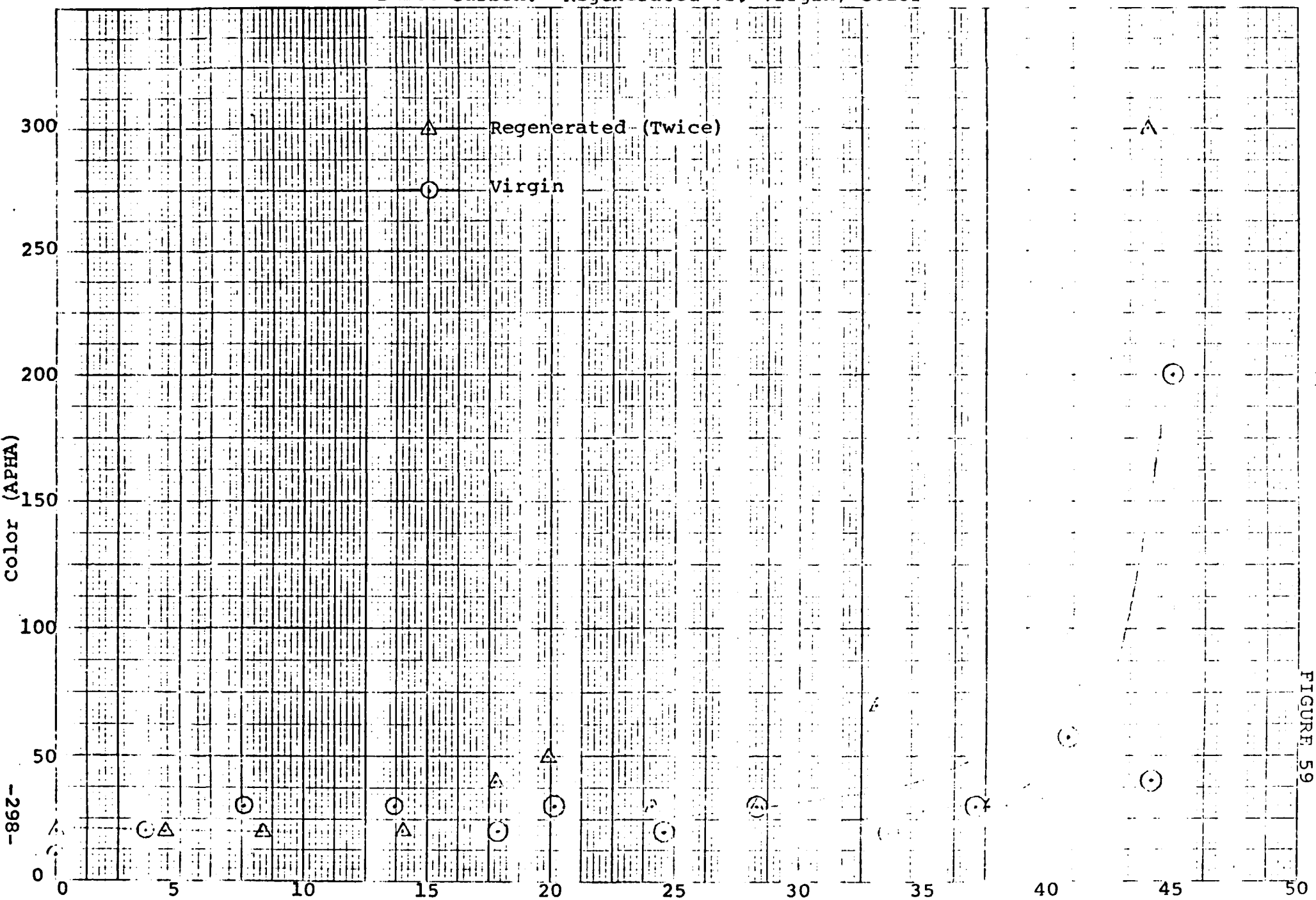


FIGURE 59

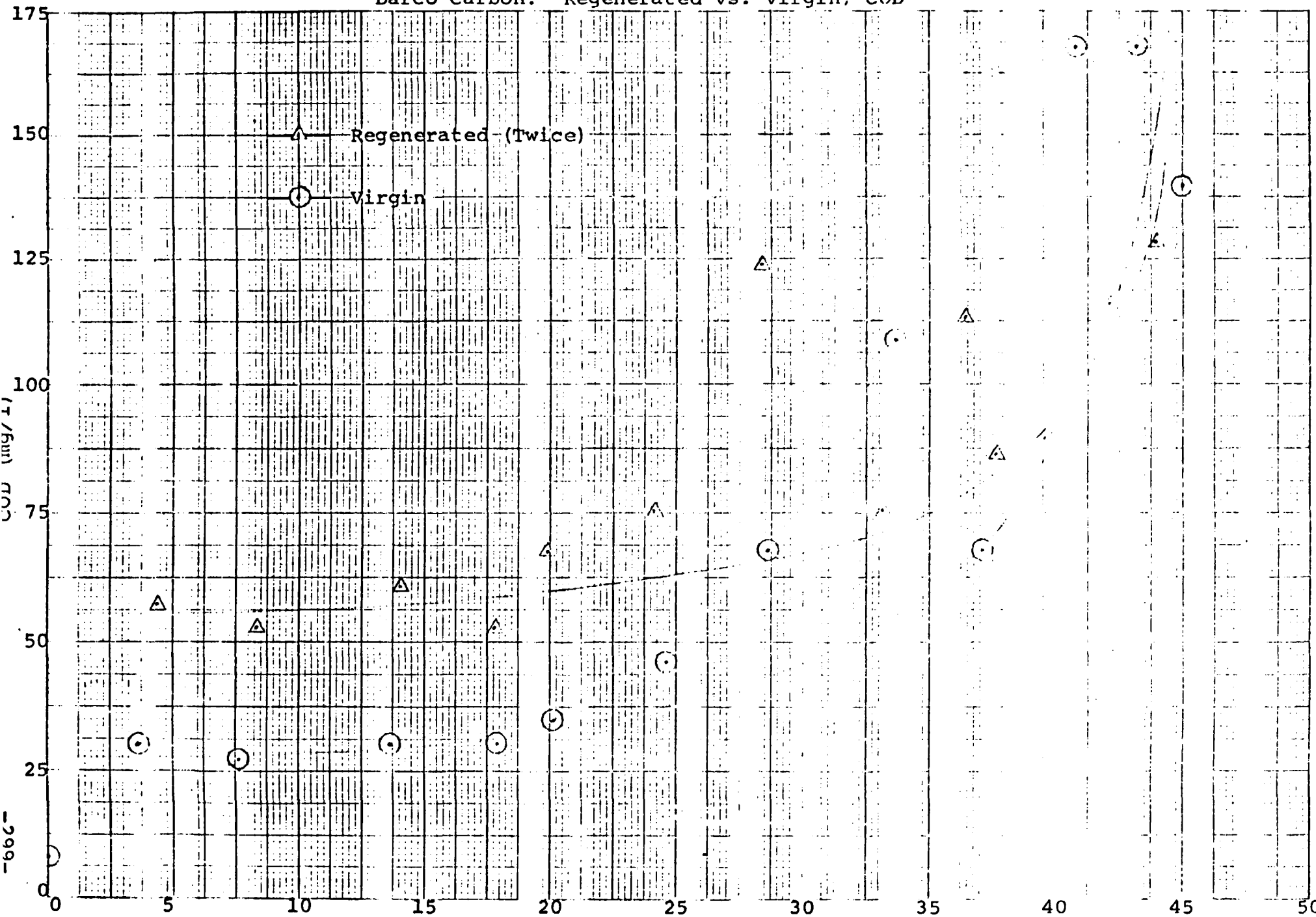

Darco Carbon: Regenerated vs. Virgin; COD
Regenerated (Twice)
Virgin
175
150
125
100
75
50
25
0
0
5
10
15
20
25
30
35
40
45
50

FIGURE 60

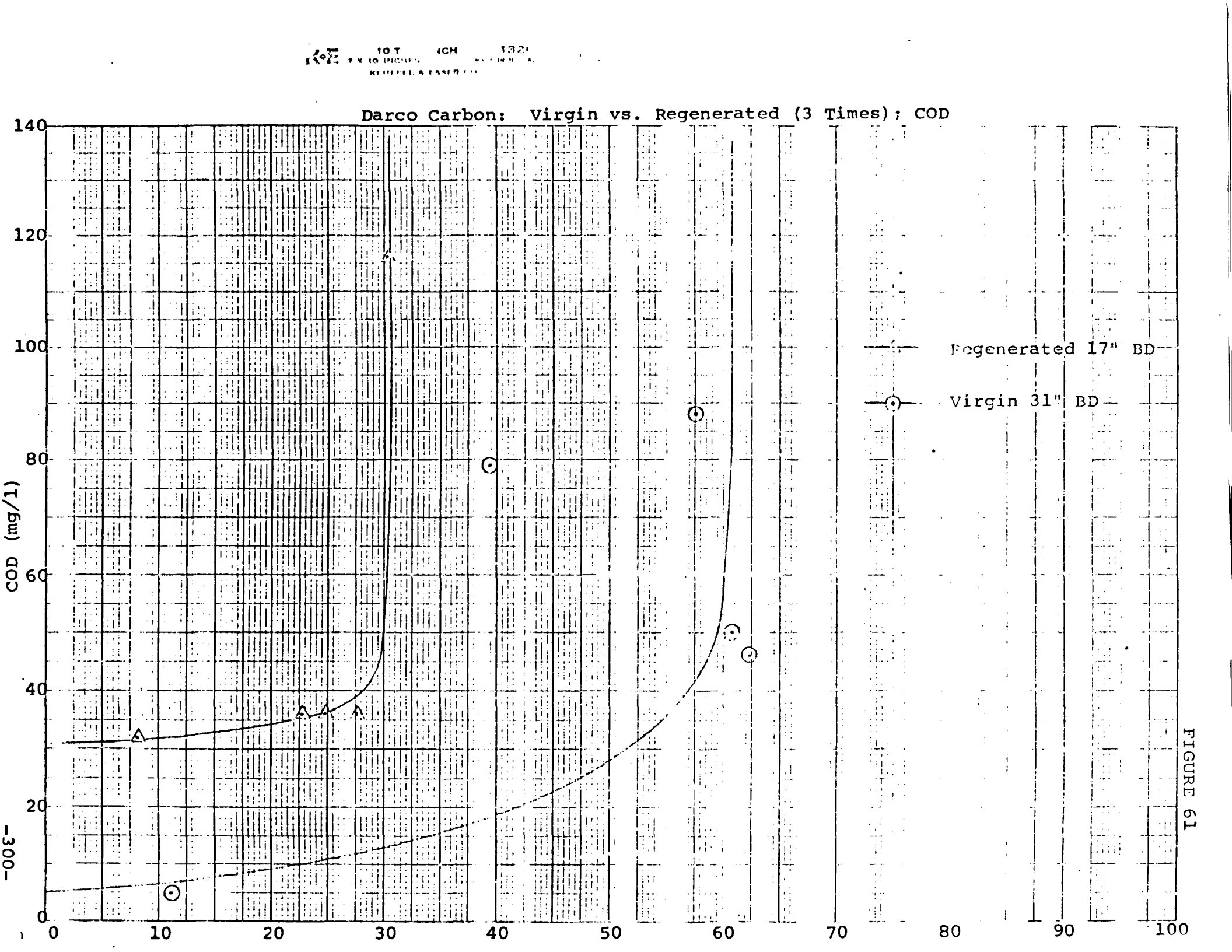

Darco Carbon: Virgin vs. Regenerated (3 Times); COD
COD (mg/l)
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Regenerated 17" BD
Virgin 31" BD

FIGURE 61

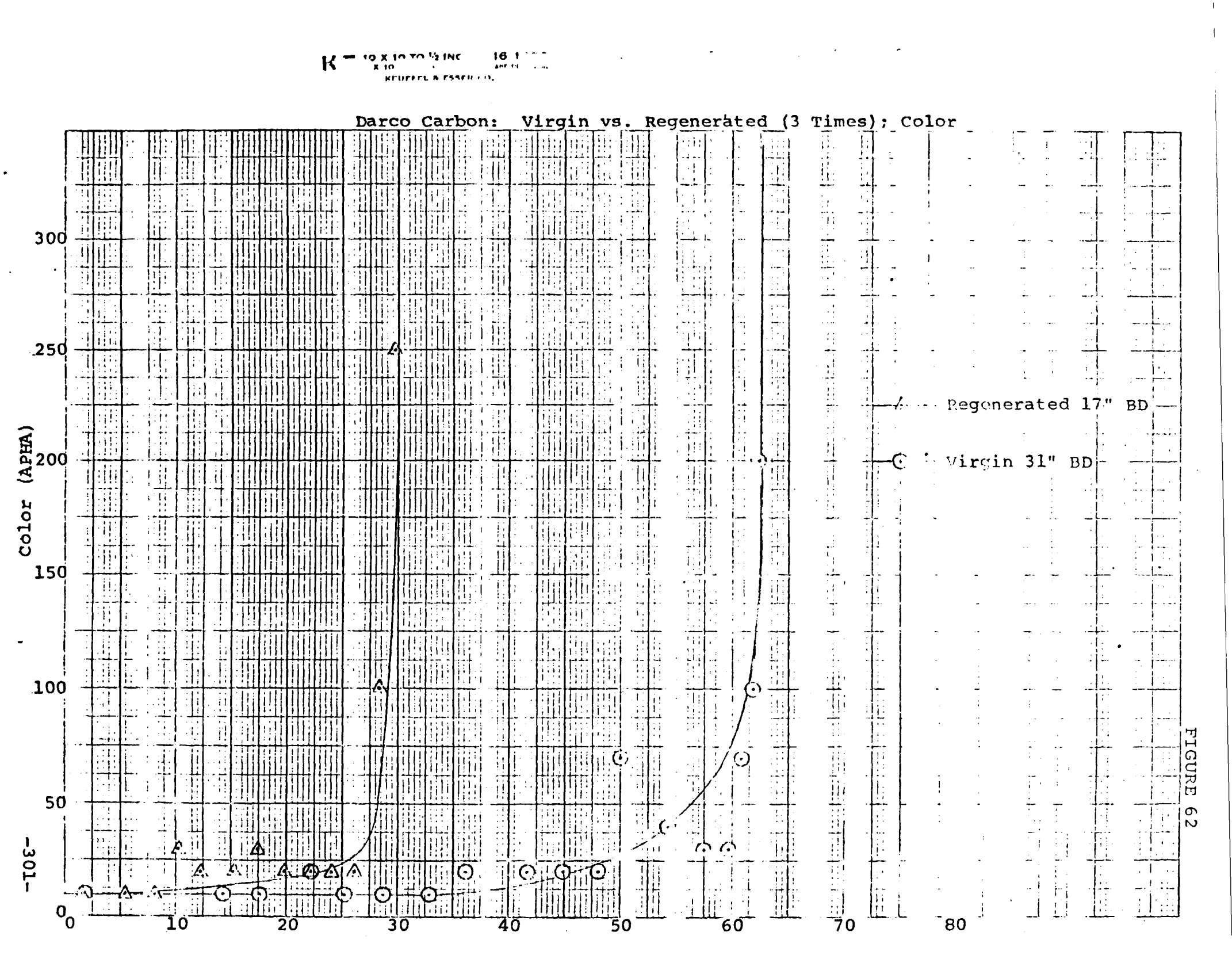

Darco Carbon: Virgin vs. Regenerated (3 Times); Color
Color (APHA)
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Regenerated 17" BD
Virgin 31" BD

FIGURE 62

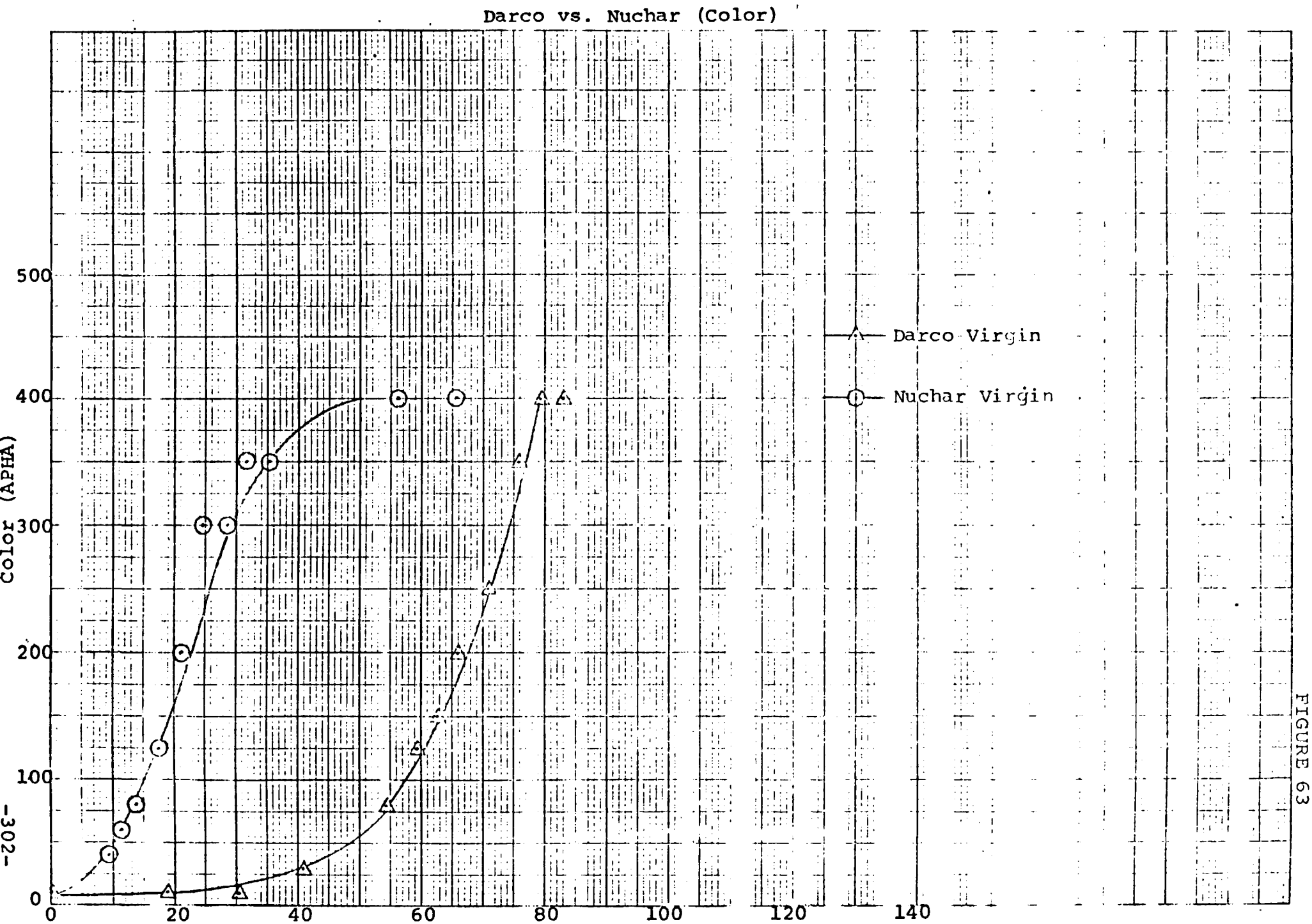


FIGURE 63

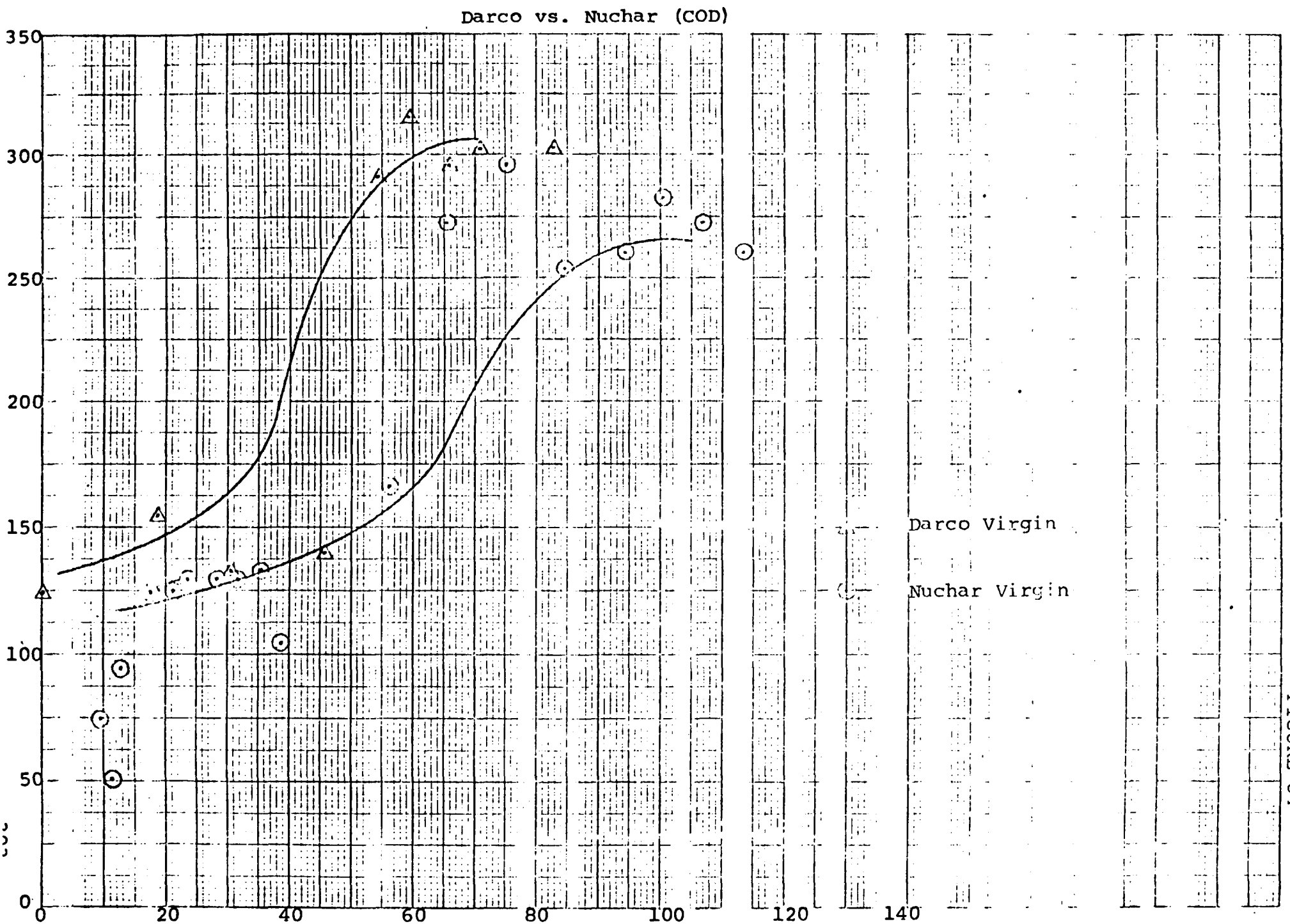

Darco vs. Nuchar (COD)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
Darco Virgin
Nuchar Virgin

FIGURE 64

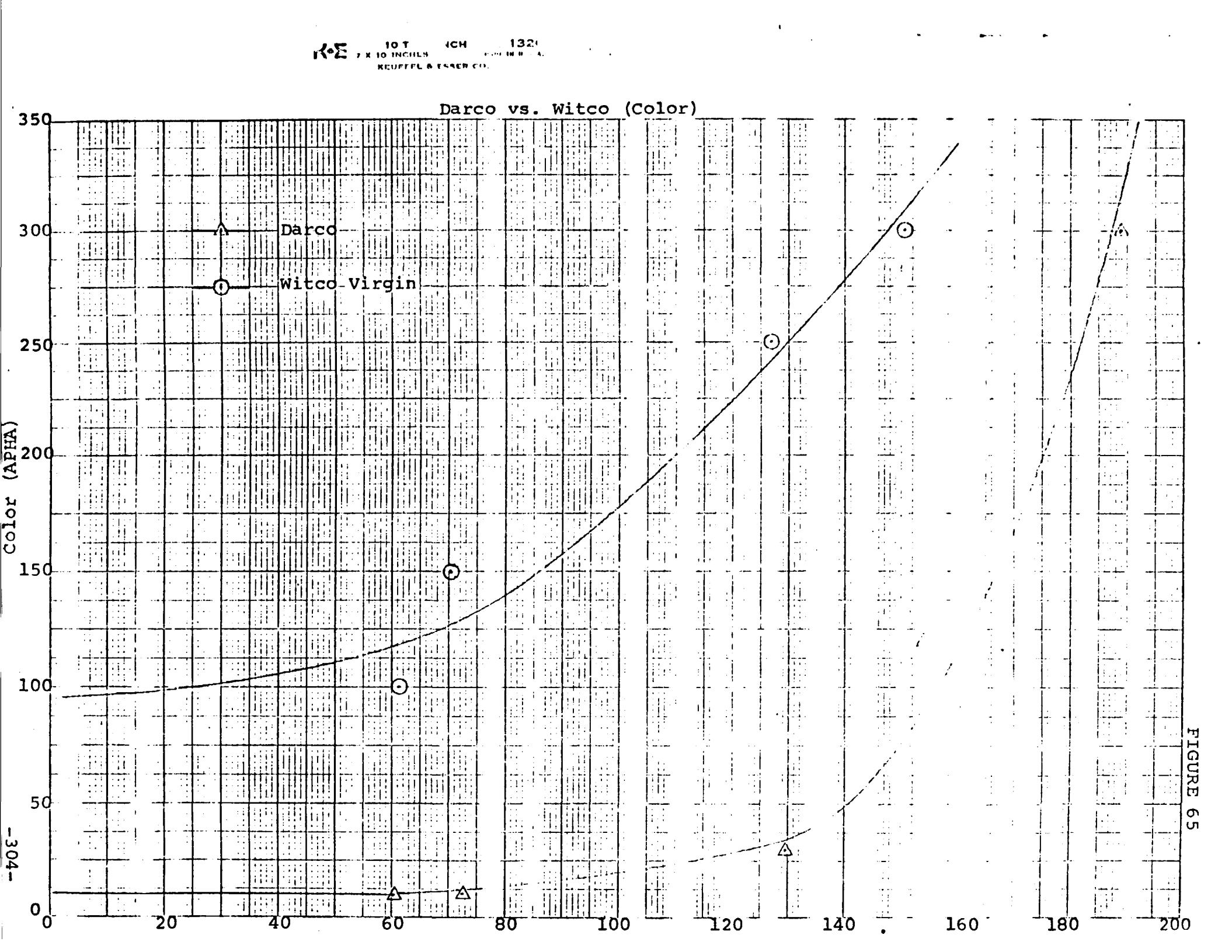

Darco vs. Witco (Color)
Darco
Witco Virgin
Color (APHA)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200

FIGURE 65

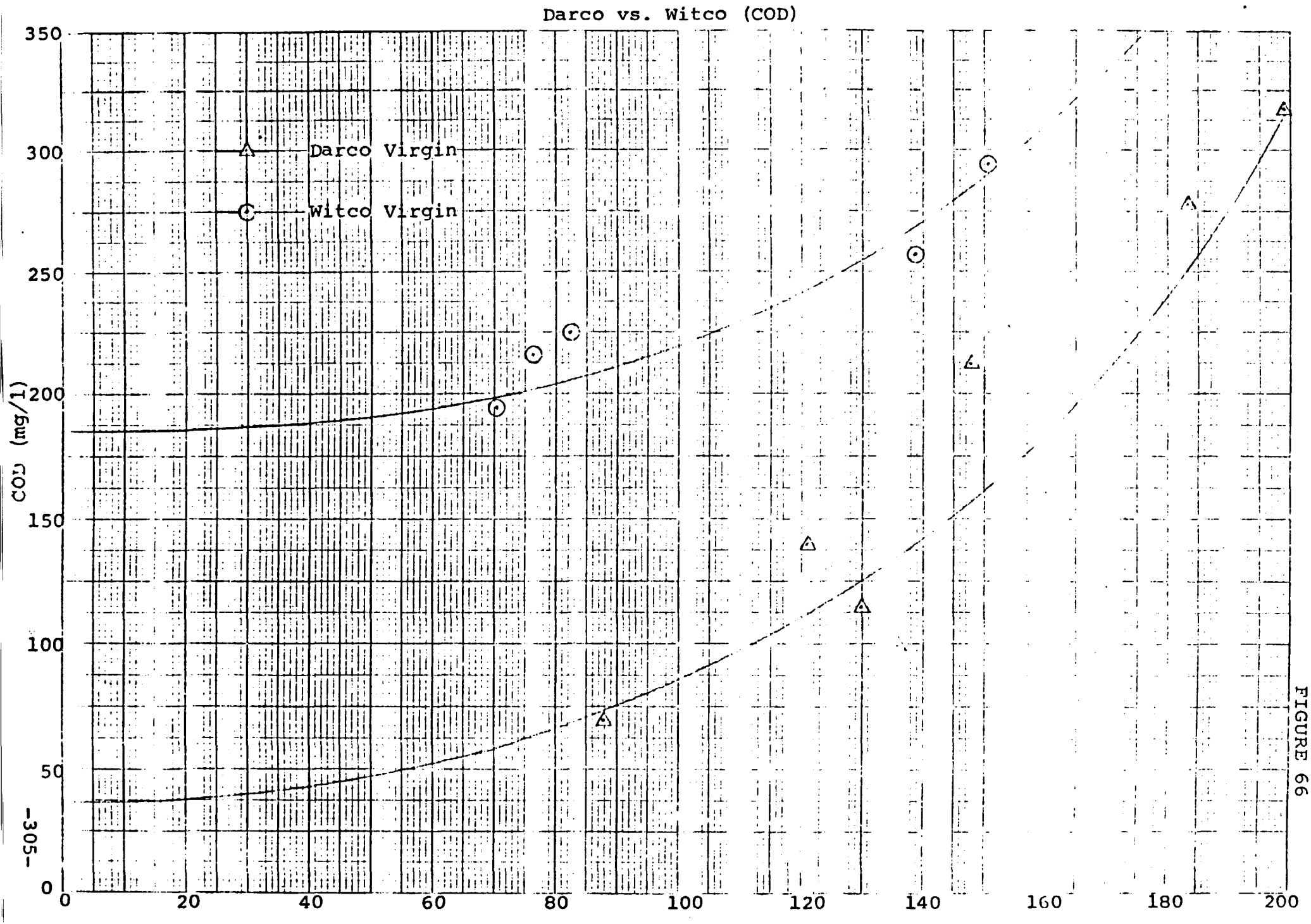

Darco vs. Witco (COD)
Darco Virgin
Witco Virgin
COD (mg/l)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200

FIGURE 66

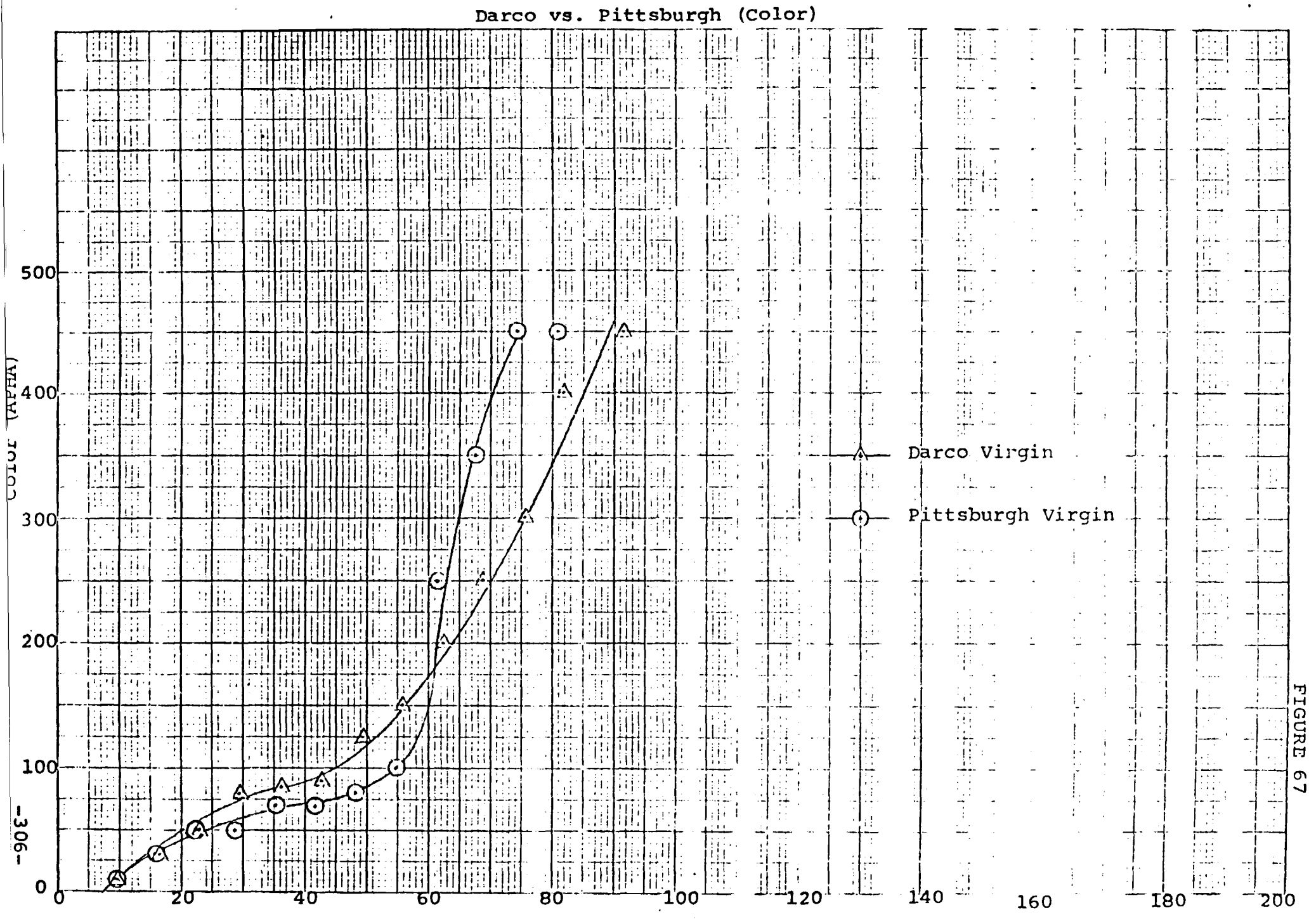


FIGURE 67

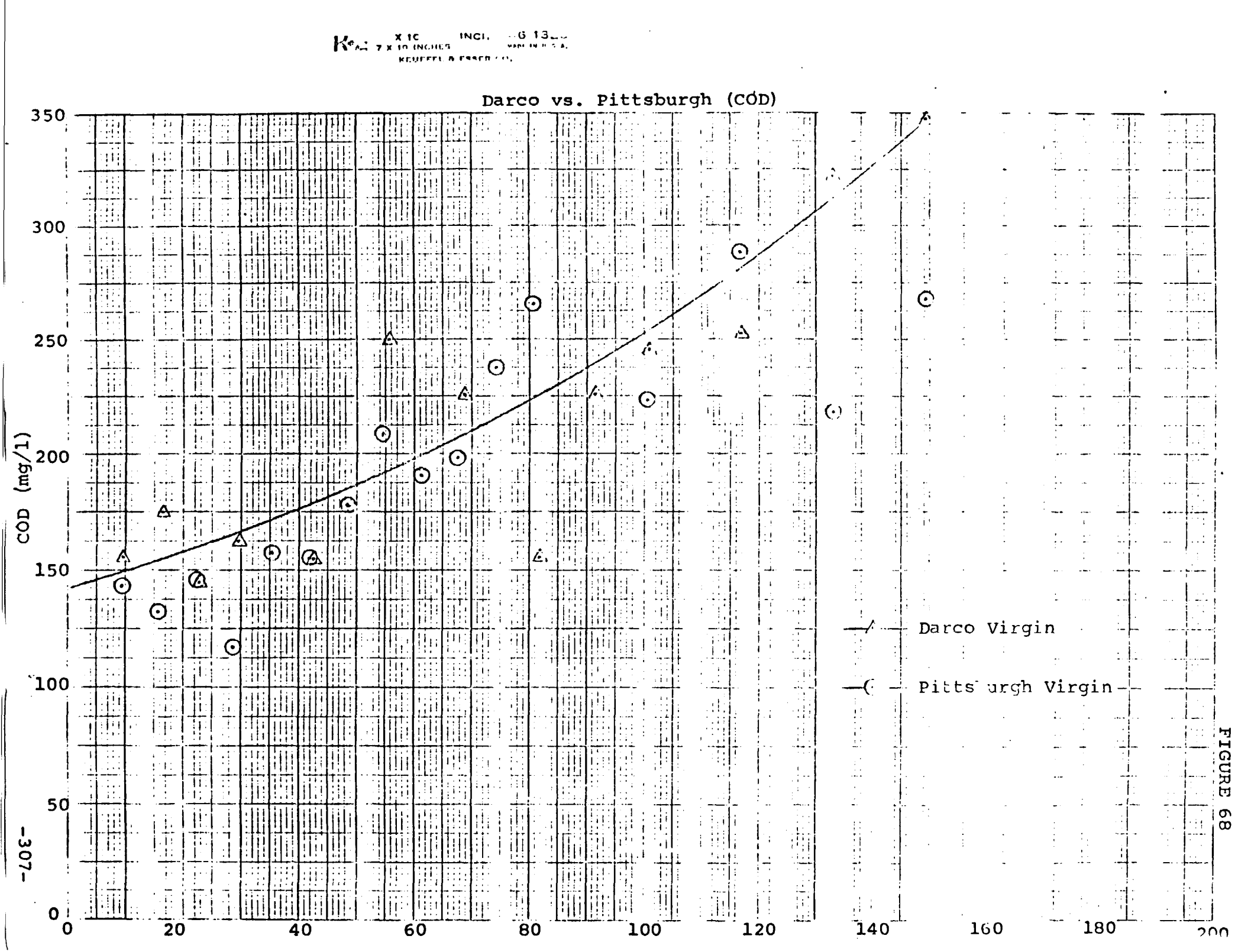

Darco vs. Pittsburgh (COD)
COD (mg/1)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200
Darco Virgin
Pittsburgh Virgin

FIGURE 68

EXHIBIT A

COD ISOTHERM WITH REGENERATED GRANULAR DARCO 8 x 35, DXL-0-4674, SPENT ON SAUGET WASTE

The attached isotherms and data give the pertinent information on the performance of the regenerated Granular DARCO 8 x 35.

The spent carbon was regenerated in the granular form in a laboratory cage furnace. Both carbons were ground to 100% minus 325 mesh prior to running the isotherms. The moistures were 6.2% on the regenerated carbon and 5.8% on the virgin carbon. With nearly identical moistures, comparisons can be made on an "as-is" basis.

Since:

1. the carbon which was used as a control was not the identical carbon,

2. the isotherms intersect, and

3. the slopes of the isotherms are almost the same,

it is concluded the COD adsorption performance of the regenerated material is approximately equal to its virgin counterpart.

TABLE 92

POWDERED CARBON ISOTHERM DATA

Date Sampled 5/26/71 (Approx.) Run 7/20/71

Sample Sauget Waste

Company Monsanto Biodize

As Received, conc. 100% pH 6.8

Carbon and No. See Below

Contact Conc. 100% Time 1 hour Temp. R.T. pH As Is

Sample Size 200 cc Agitation Atlab Shaker

Filter Aid None Paper Whatman #5 Washed? Yes

Analysis and Method Std. Wet COD

Cell Size, cm - Wave Length -

Carbon Dose	(ppm COD) Remaining	(COD) Removed	% Remaining	% Removed	X(ppm) / M(ppm)
ppm	DARCO 8 x 35 DXL-0-4683				
250	168	60			.24
500	133	95			.19
1,000	82	146			.146
2,000	66	162			.081
3,000	58	170			.057
4,000	50	178			.045
8,000	46	182			.023
	DARCO 8 x 35 DXL-0-4674 Regenerated				
250	158	70			.28
500	135	93			.19
1,000	96	132			.13
2,000	82	146			.073
3,000	77	151			.050
4,000	68	160			.040
8,000	58	170			.021
C_o	228				

COD ISOTHERM ON SOUGET WASTE 5/26/71

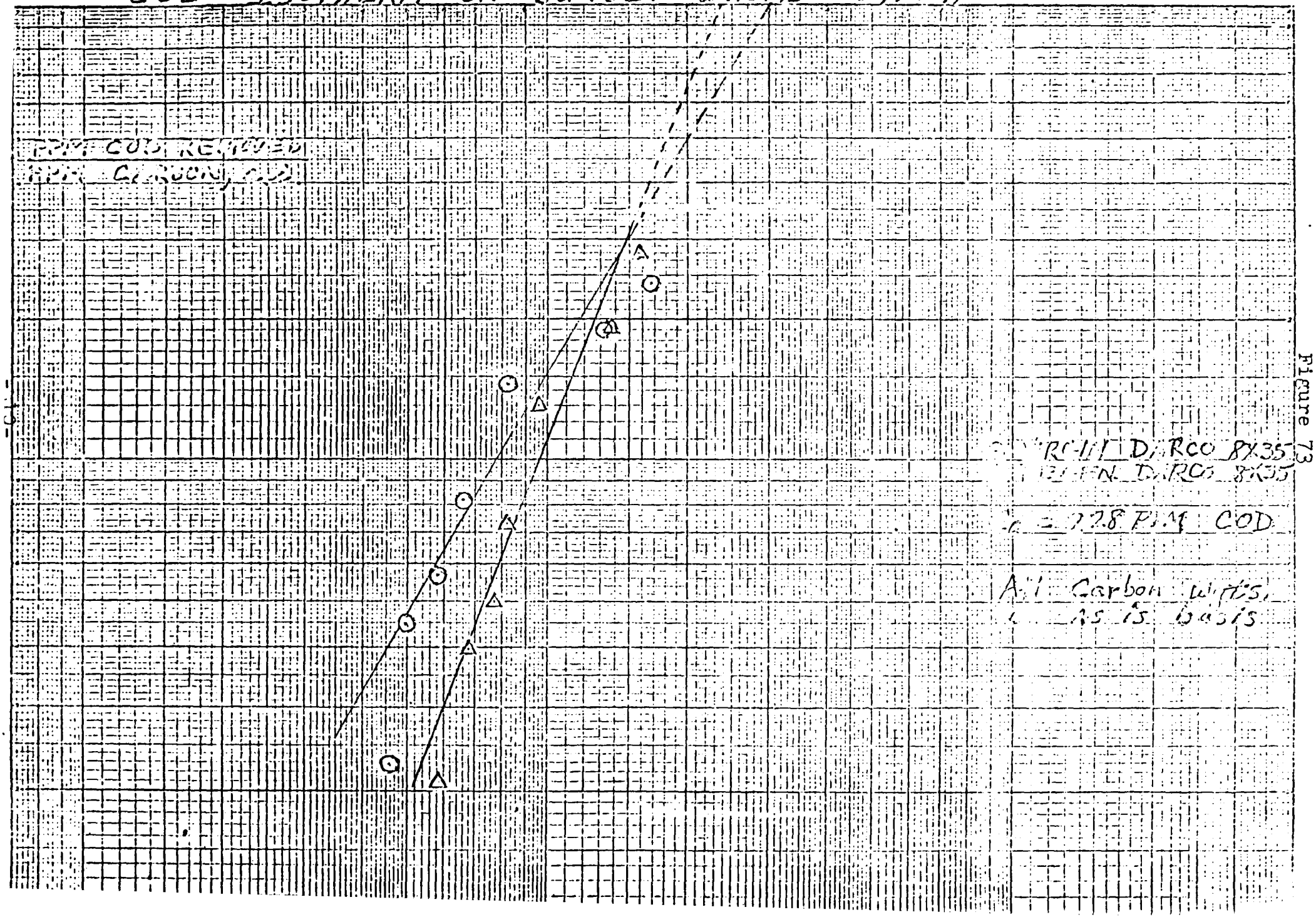


Figure 73

EXHIBIT B

ATLAS CHEMICAL INDUSTRIES, INC.

POLLUTION CONTROL VENTURE DEPARTMENT

WILMINGTON, DELAWARE 19899

TEL 302-658-9311

September 8, 1971

Mr. Bruce Davis, Field Engineer
Monsanto Envirochem Systems
Village of Sauget
Sauget Sewage Treatment Plant
Sauget, Illinois 62201

Dear Bruce:

Confirming our September 8 phone conversation, your sample of spent Granular DARCO has been regenerated at our Marshall, Texas, laboratory. The regenerated product (marked DXL-0-4891) was sent to you parcel post September 1.

The regeneration conditions were:

Furnace - 4" Rotary Tube
Avg. Temp. - 800°C
Environment - Steam
Avg. Discharge Rate - 2.0 lbs./hr.

The material balance is given in Table 1. The yield was only 88.6% compared to 95% usually obtained in the equipment. An effort is being made to find the cause.

Table 1

1.	Weight of sample received (after drying), "as is"	= 8.42 lb.
2.	Weight removed for analyses, "as is"	= 0.4 lb.
3.	Spent carbon weight for regeneration, "as is"	= 8.02 lb.
4.	Moisture in spent carbon (after drying)	= 4.30%
5.	Spent carbon weight, dry basis = 8.02 x (1.0-.043)	= 7.68 lb.
[a]6.	Adsorbed impurities in dry spent carbon	= 14.6%
7.	Virgin carbon, dry basis, in spent carbon = 7.68 x (1.0-.146)	= 6.56 lb.

[a]Determined from the difference in vibrating feed density of spent carbon and virgin carbon.

8. Regenerated carbon discharge weight, dry basis = 5.81 lb.
9. Yield from regeneration = (5.81x100) ÷ 6.56 = 88.6%
10. Weight of sample removed for analyses, "as is" = 0.18 lb.
11. Weight of regenerated carbon returned, "as is" = 5.73 lb.

Properties (dry basis) of the virgin, spent, and regenerated carbon are given in Table 2. The regenerated carbon appears to be slightly overregenerated which is also indicated by the low yield. Since the properties are not drastically different from those of the virgin carbon, it should be safe to run your column tests comparing the regenerated and virgin carbon.

Table 2

	Virgin	Spent	Regenerated
Molasses RE NAP	95	66	110
Granular pH	4.6	7.9	10.6
H_2O Solubles	0.85	1.7	1.7
PA Density	0.372	0.417	0.345
VFA Density	0.416	0.487	0.410
Iodine Number	580	274	622
% Dust	0.12	--	0.09
Screen (Ro-Tap)			
+ 8	0.7	0.9	1.2
8 x 12	22.4	15.0	15.6
12 x 16	32.3	27.7	28.1
16 x 20	25.7	28.7	29.2
20 x 30	17.4	22.9	22.4
30 x 35	1.3	3.0	2.9
- 35	0.2	1.8	0.6
Granular Oven Moisture	5.6	4.3	1.2

Our laboratory indicated that several materials which appeared to be toluidine and nitrobenzene condensed from the flue gas during the regeneration.

As Jerry requested during our visit to Sauget, I am sending you a one-lb. sample of pulverized Granular DARCO 8 x 35 which can be used for isotherms and a copy of an internal bed depth-service time procedure (BDST). Since this is our internal procedure, I would appreciate your keeping it within your group.

Very truly yours,

Roy A. Hutchins
Systems Engineer

RAH:bae
Attachment

EXHIBIT C

Witco Chemical

June 15, 1971

Mr. Jerry Jones
Village of Sauget Treatment Plant
Sauget, Illinois 62201

Dear Mr. Jones:

Adsorption tests were run on pulverized Witco Grade 718 and Darco activated carbons with effluent from the Village of Sauget Treatment Plant.

Various dosages of pulverized carbon, as indicated in the results below, were shaken with 100 ml. portions of effluent for one hour at 28°C. The carbon was then removed by filtration and COD determined on the filtrates.

Results:

	Carbon Dosage(g) (M)	mg/l COD Remaining (C_R)	mg/l COD Adsorbed	mg/l COD Adsorbed (X)	mg COD adsorbed per gram (X/M)
	0.0	244 (C_o)	--	--	--
itco	0.1	94	150	15.0	150.0
rade	0.2	66	178	17.8	89.0
718	0.5	58	186	18.6	37.2
	1.0	50	194	19.4	19.4
	2.0	40	204	20.4	10.2
	0.0	244 (C_o)	--	--	--
	0.1	110	134	13.4	130.4
Darco	0.2	78	166	16.6	83.0
	0.5	62	182	18.2	36.4
	1.0	70	174	17.4	17.4
	2.0	42	202	20.2	10.1

Witco Chemical Corporation
Activated Carbon Division, P. O. Box 110, Oakland, New Jersey 07436 Area Code 201 Telephone 337-581

Adsorption isotherms developed from the above data are attached. Extrapolation of the isotherms to the effluent concentration (C_o) indicated ultimate capacities as follow:

	Ultimate Capacity
Witco Grade 718	265 mg COD/gram
Darco	220 mg COD/gram

Color, odor and foam removal with 0.1% dosages of carbon were noted as follows:

	0.1 g Witco 718/100 ml.	0.1 g Darco/100 ml.
Color	Completely removed	sl. tinge remaining
Odor	very slight, if any	very slight
Foam	none remaining	none remaining

If we can be of further assistance, please feel free to call me.

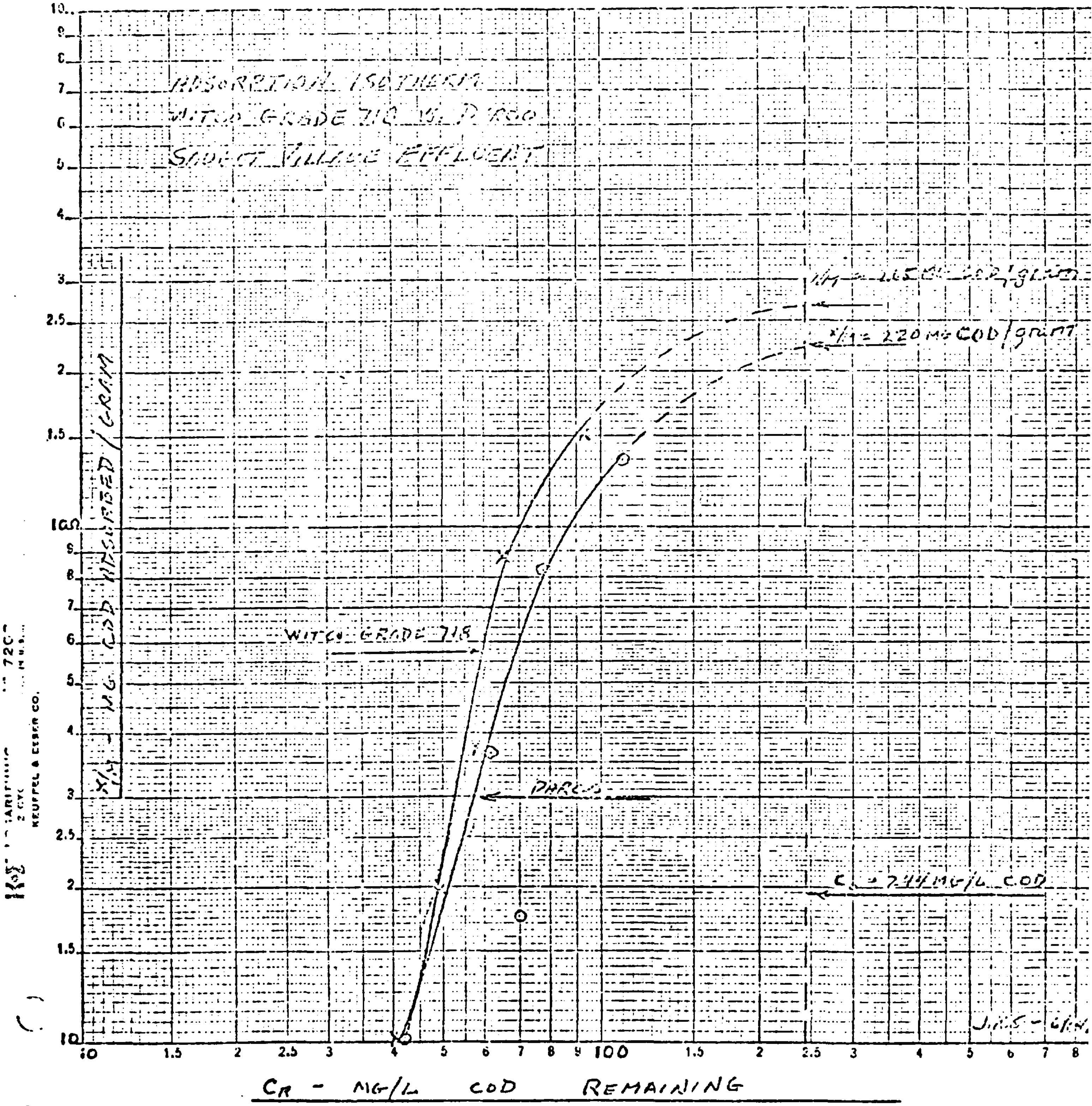
Very truly yours,

vmsj for JKsmith

J. K. Smith

JKS/dab

Figure 74


WITCO GRADE 718
PARCO
X/M - MG COD ABSORBED / GRAM
CR - MG/L COD REMAINING

Witco Chemical

September 30, 1971

Mr. Bruce Davis
Monsanto Envirochem
c/o Monsanto Krummrick Plant
Sauget Village, Illinois 62201

Dear Mr. Davis,

As I told you in our telephone conversation today, we have successfully regenerated the spent carbon you sent us. I am sending you the 75 grams or so of the regenerated product for your evaluation. Please let me know of your results and any further requirement for our assistance.

The spent carbon, after drying, had a CTA of 43 and an A.D. of .55 grams/cc; after regeneration of 100 grams for 15 minutes at 1760°F. in a steam atmosphere, the CTA was found to be 60 and the A.D. was .47. These values are those of the virgin carbon, hence, I regard the regeneration as completely satisfactory and expect your evaluation will confirm my judgement. While our experimental conditions were not such that a precise determination of carbon loss during regeneration could be made, we estimated it to be under 5%, which is generally satisfactory. The ash content increased by about .5% or so, indicating that some iron and possibly metals were adsorbed from your effluent.

I am much encouraged by these findings and look forward to developing with you the use of our carbon in your application.

Very truly yours,

C. M. Saffer, Jr.
Technical Director

CMS/dab

cc: Mr. R. C. Smith

Witco Chemical

October 26, 1971

Mr. Bruce Davis
Monsanto Envirochem
c/o Monsanto Krummrick Plant
Sauget Village, Illinois 62201

Dear Mr. Davis,

We have regenerated the sample of spent carbon you sent us. After treatment, about 1½ lbs. was obtained. This was shipped to you on 21 October 1971.

The properties of the regenerated carbon are essentially those of the earlier sample you received from us. On this basis I expect it to perform as well as the virgin carbon.

Please let me know your findings.

Very truly yours,

C. M. Saffer, Jr.
Technical Director

CMS/dab

Witco Chemical Corporation
Activated Carbon Division, P. O. Box 110, Oakland, New Jersey 07436 Area Code 201 Telephone 337-5812

ICI America Inc.

(Formerly Atlas Chemical Ind., Inc.)

POLLUTION CONTROL VENTURE DEPT.

Wilmington, Delaware 19899
(302) 658-9311

May 17, 1972

Mr. Jerry L. Jones
Technical Service Manager
Monsanto Enviro-Chem Systems, Inc.
10 South Riverside Plaza
Chicago, Illinois 60606

Dear Jerry:

The analyses of the samples of spent Granular DARCO 8 x 35 regenerated for the second and third time have finally been obtained and are included herein. I apologize for the delay. Analyses of the virgin and once-regenerated carbons were reported in my letter of September 8, 1971, to Bruce Davis.

The analyses of all of the samples regenerated are given in the attached table.

The first regeneration was of a large batch of about six pounds and was done in the 4-inch rotary furnace. Control problems resulted in over-regeneration which is evident in the increases in molasses RE, Iodine Number and ash, and the decrease in density.

The second and third regenerations were done in a cage furnace. The desired final weight of the regenerated products was calculated from vibrating feed densities as follows:

$$R = \frac{W \times V}{S}$$

where: R = theoretical weight of regenerated carbon restored to original density, g.,
W = weight of spent carbon, g.,
V = vibrating feed density of virgin carbon, g./ml.,
S = vibrating feed density of spent carbon, g./ml.

When the desired weight is reached, the cage is withdrawn and cooled in flowing nitrogen. It is then reweighed to obtain an actual weight.

The following conditions were used:

	2nd	3rd
Furnace Temperature, °C.	990	985
Steam Rate, ml./min.	5	5
Final Bed Temperature, °C.	770	720
Total Calc. Final Weight, g.	561.2	297.0
Total Actual Final Weight, g.	562.0	297.2
Number of Batches Regenerated	4	2
Avg. Regeneration Time/Batch, min.	10	12

Note that the densities of the second and third regenerated carbons were not restored to that of the virgin carbon even though the regenerations were carried to the weight very closely corresponding to virgin carbon density. Also, molasses RE and surface area were not completely restored. The values for percentage ash and water solubles do not indicate extensive ash build-up upon recycling. Thus, this apparently did not contribute to the lack of complete regeneration. Apparently, the sorbed material leaves appreciable carbon residue upon pyrolysis.

Also, note that the grams of material sorbed per gram of carbon decreased as surface area and RE decreased.

If you have any questions, please call.

Regards,

Roy A. Hutchins
Applications Supervisor

RAH:bae
Attachment

TABLE 93

ANALYSES[a] OF SAMPLES FOR MONSANTO ENVIRO-CHEM STUDIES

	Virgin	Regenerated		
		1st[b]	2nd[c]	3rd[c]
Molasses RE, NAW	95	110	91	92
Iodine Number NAW	580	622	510	500
Ash, NAW, %	13.4	15.1	16.9	15.6
Water Solubles, %	0.85	1.7	--[d]	1.7
pH	4.6	10.6	--[d]	10.1
V.F.A. Density, g./ml.,				
Regenerated	0.416	0.410	0.430	0.431
Spent	--	0.487	0.468	0.458
Grams of Sorbed Material per gram of Carbon[e]	--	0.171	0.141	0.063
Screen Analyses (U.S.Std.), Wt. %				
+ 8 M.	0.7	1.2	--[d]	1.0
8 x 12	22.4	15.6	--	19.1
12 x 16	32.3	28.1	--	29.9
16 x 20	25.7	29.2	--	29.0
20 x 30	17.4	22.4	--	18.6
30 x 35	1.3	2.9	--	1.6
- 35	0.2	0.6	--	0.8

[a] All analyses dry basis.

[b] Received as a large batch and regenerated in 4-inch rotary furnace.

[c] Received as small batches and regenerated in cage furnace.

[d] Omitted through an oversight. All the sample had been returned for further adsorption tests before this was observed.

[e] Calculated from gain in density of the carbon from the start to the end of a cycle ratioed with the density at the start of the cycle.

EXHIBIT D

```
150 DATA 1,0
151 DATA 4,0
152 DATA 7,0
RUN

EIOC          17:25   08/13/71  FRIDAY      103

ROUGH PRELIMINARY INVESTMENT AND OPERATING COST ESTIMATES


TOTAL PLANT FLOW IS  25.0 MGD.

FIXED-BED SYSTEM
MUNICIPAL ACCOUNT

BASED ON COLOR REMOVAL


CONTACT FLOW RATE IS  1.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST                          4544372
CARBON COST,(2)                         1067436
TOTAL                                   5611808

OPERATING COSTS,$/1000 GALLONS

UTILITIES                                .0176
LABOR, SUPPLIES,OVERHEAD,(3)             .0188
CARBON MAKEUP                            .1444
MAINTENANCE & INSURANCE,(3)              .0324   → 0.2132
AMORITIZATION@ 6.7%/YEAR                 .0558
TOTAL OPERATING COST                     .2689


VOLUME OF CARBON IN INITIAL FILL,CU.FT.    139259
WEIGHT OF CARBON IN INITIAL FILL,LBS.      3272608
BED DEPTH,FT.                                   28
CROSS SECTIONAL AREA OF FLOW,SQ.FT.           4959
REGENERATION RATE,LBS./DAY                  198313
CARBON DOSAGE,LBS./1000GAL.                   7.93


CONTACT FLOW RATE IS  4.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST                          2712996
CARBON COST,(2)                          462961
TOTAL                                   3175957

OPERATING COSTS,$/1000 GALLONS
```

UTILITIES	.0203
LABOR, SUPPLIES, OVERHEAD, (3)	.0141
CARBON MAKEUP	.1668
MAINTENANCE & INSURANCE, (3)	.0191 .2203
AMORITIZATION@ 8.7%/YEAR	.0316
TOTAL OPERATING COST	.2520

VOLUME OF CARBON IN INITIAL FILL, CU.FT.	34814
WEIGHT OF CARBON IN INITIAL FILL, LBS.	818152
BED DEPTH, FT.	7
CROSS SECTIONAL AREA OF FLOW, SQ.FT.	4959
REGENERATION RATE, LBS./DAY	229159
CARBON DOSAGE, LBS./1000GAL.	9.17

CONTACT FLOW RATE IS 7.00 BED VOLUMES/HOUR
FIXED INVESTMENT, (1), $

INSTALLED COST	2433291
CARBON COST, (2)	417887
TOTAL	2851178

OPERATING COSTS, $/1000 GALLONS

UTILITIES	.0241
LABOR, SUPPLIES, OVERHEAD, (3)	.0134
CARBON MAKEUP	.1976
MAINTENANCE & INSURANCE, (3)	.0172
AMORITIZATION@ 8.7%/YEAR	.0283
TOTAL OPERATING COST	.2806

VOLUME OF CARBON IN INITIAL FILL, CU.FT.	19894
WEIGHT OF CARBON IN INITIAL FILL, LBS.	467515
BED DEPTH, FT.	4

CROSS SECTIONA+

ROUGH PRELIMINARY INVESTMENT AND OPERATING COST ESTIMATES

TOTAL PLANT FLOW IS 25.0 MGD.

PULSED-BED SYSTEM
INDUSTRIAL ACCOUNT

BASED ON COLOR REMOVAL

CONTACT FLOW RATE IS 1.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	4754507
CARBON COST,(2)	1058137
TOTAL	5812644

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0169
LABOR,WELFARE,OPER.SUPPLIES,OVERHEAD	.0113
CARBON MAKEUP	.1382
MAINTENANCE,INSURANCE,TAXES	.0571
OPERATING COST	.2234
DEPRECIATION,(3)	.1087
TOTAL OPERATING COST	.3321
COST OF CAPITAL,(3)	.0078
TOTAL INCLUDING COST OF CAPITAL	.3398

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	139259
WEIGHT OF CARBON IN INITIAL FILL,LBS.	3272608
BED DEPTH,FT.	28
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	189797
CARBON DOSAGE,LBS./1000GAL.	7.59

CONTACT FLOW RATE IS 4.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	2097594
CARBON COST,(2)	419978
TOTAL	2517572

OPERATING COSTS,$/1000 GALLONS

II

UTILITIES	.0169
LABOR,WELFARE,OPER.SUPPLIES,OVERHEAD	.0113
CARBON MAKEUP	.1382
MAINTENANCE,INSURANCE,TAXES	.0252
OPERATING COST	.1915
DEPRECIATION,(3)	.0479
TOTAL OPERATING COST	.2395
COST OF CAPITAL,(3)	.0034
TOTAL INCLUDING COST OF CAPITAL	.2429

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	34814
WEIGHT OF CARBON IN INITIAL FILL,LBS.	818152
BED DEPTH,FT.	7
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	189797
CARBON DOSAGE,LBS./1000GAL.	7.59

CONTACT FLOW RATE IS 7.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	1683207
CARBON COST,(2)	328813
TOTAL	2012020

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0169
LABOR,WELFARE,OPER.SUPPLIES,OVERHEAD	.0113
CARBON MAKEUP	.1382
MAINTENANCE,INSURANCE,TAXES	.0202
OPERATING COST	.1865
DEPRECIATION,(3)	.0385
TOTAL OPERATING COST	.2250
COST OF CAPITAL,(3)	.0028
TOTAL INCLUDING COST OF CAPITAL	.2278

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	19894
WEIGHT OF CARBON IN INITIAL FILL,LBS.	467515
BED DEPTH,FT.	4
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	189797
CARBON DOSAGE,LBS./1000GAL.	7.59

(1) SYSTEM INCLUDES ADSORPTION AND REGENERATION FACILITIES, BUT NOT LAND, BUILDING, OR FACILITIES WHICH MAY BE REQUIRED FOR PRETREATING THE WASTE PRIOR TO ADSORPTION SUCH AS FILTRATION AND CLARIFICATION.
(2) CARBON COSTS ARE FOR INITIAL FILL AND TWO MONTHS OPERATING SUPPLY AT 7% MAKEUP USING AN ESTIMATED CARBON COST OF $ .26 /LB. DELIVERED.
(3) COST OF CAPITAL AND DEPRECIATION VALUES BASED ON 10% INTEREST RATE OF RETURN, 10 YEAR ECONOMIC LIFE AND 5 YEAR DEPRECIABLE LIFE OF THE EQUIPMENT.

TIME

READY

RUN

EIOC 17:16 08/13/71 FRIDAY 103

ROUGH PRELIMINARY INVESTMENT AND OPERATING COST ESTIMATES

TOTAL PLANT FLOW IS 25.0 MGD.

FIXED-BED SYSTEM
INDUSTRIAL ACCOUNT

BASED ON COLOR REMOVAL

CONTACT FLOW RATE IS 1.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	4544372
CARBON COST,(2)	1067436
TOTAL	5611808

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0176
LABOR,WELFARE,OPER.SUPPLIES,OVERHEAD	.0113
CARBON MAKEUP	.1444
MAINTENANCE,INSURANCE,TAXES	.0545
OPERATING COST	.2278
DEPRECIATION,(3)	.1039
TOTAL OPERATING COST	.3317
COST OF CAPITAL,(3)	.0074
TOTAL INCLUDING COST OF CAPITAL	.3391

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	139259
WEIGHT OF CARBON IN INITIAL FILL,LBS.	3272608
BED DEPTH,FT.	28
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	198313
CARBON DOSAGE,LBS./1000GAL.	7.93

CONTACT FLOW RATE IS 4.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	2712996
CARBON COST,(2)	462961
TOTAL	3175957

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0203
LABOR,WELFARE,OPER.SUPPLIES,OVERHEAD	.0113
CARBON MAKEUP	.1666
MAINTENANCE,INSURANCE,TAXES	.0326
OPERATING COST	.2311
DEPRECIATION,(3)	.0620
TOTAL OPERATING COST	.2931
COST OF CAPITAL,(3)	.0044
TOTAL INCLUDING COST OF CAPITAL	.2975

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	34814
WEIGHT OF CARBON IN INITIAL FILL,LBS.	818152
BED DEPTH,FT.	7
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	229159
CARBON DOSAGE,LBS./1000GAL.	9.17

CONTACT FLOW RATE IS 7.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	2433291
CARBON COST,(2)	417887
TOTAL	2851178

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0241
LABOR,WELFARE,OPER.SUPPLIES,OVERHEAD	.0113
CARBON MAKEUP	.1976
MAINTENANCE,INSURANCE,TAXES	.0292
OPERATING COST	.2622
DEPRECIATION,(3)	.0556
TOTAL OPERATING COST	.3178
COST OF CAPITAL,(3)	.0040
TOTAL INCLUDING COST OF CAPITAL	.3218

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	19694
WEIGHT OF CARBON IN INITIAL FILL,LBS.	467515
BED DEPTH,FT.	4
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	271367
CARBON DOSAGE,LBS./1000GAL.	10.85

(1) SYSTEM INCLUDES ADSORPTION AND REGENERATION FACILITIES, BUT NOT LAND, BUILDING, OR FACILITIES WHICH MAY BE REQUIRED FOR PRETREATING THE WASTE PRIOR TO ADSORPTION SUCH AS FILTRATION AND CLARIFICATION.
(2).CARBON COSTS ARE FOR INITIAL FILL AND TWO MONTHS OPERATING SUPPLY AT 7% MAKEUP USING AN ESTIMATED CARBON COST OF $ .26 /LB. DELIVERED.
(3) COST OF CAPITAL AND DEPRECIATION VALUES BASED ON 10% INTEREST RATE OF RETURN, 10 YEAR ECONOMIC LIFE AND 5 YEAR DEPRECIABLE LIFE OF THE EQUIPMENT.

TIME . 2 SECS.
DAT

RUN

EIOC 17:02 08/13/71 FRIDAY 103

ROUGH PRELIMINARY INVESTMENT AND OPERATING COST ESTIMATES

TOTAL PLANT FLOW IS 25.0 MGD.

PULSED-BED SYSTEM
MUNICIPAL ACCOUNT

BASED ON COLOR REMOVAL

CONTACT FLOW RATE IS 1.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	4754507
CARBON COST,(2)	1058137
TOTAL	5812644

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0169
LABOR, SUPPLIES,OVERHEAD,(3)	.0193
CARBON MAKEUP	.1382
MAINTENANCE & INSURANCE,(3)	.0338 — 0.2082
AMORITIZATION 6.7%/YEAR	.0578
TOTAL OPERATING COST	.2660

VOLUME OF CARBON IN INITIAL FILL,CU.FT.	139259
WEIGHT OF CARBON IN INITIAL FILL,LBS.	3272608
BED DEPTH,FT.	28
CROSS SECTIONAL AREA OF FLOW,SQ.FT.	4959
REGENERATION RATE,LBS./DAY	189797
CARBON DOSAGE,LBS./1000GAL.	7.59

CONTACT FLOW RATE IS 4.00 BED VOLUMES/HOUR

FIXED INVESTMENT,(1),$

INSTALLED COST	2097594
CARBON COST,(2)	419978
TOTAL	2517572

OPERATING COSTS,$/1000 GALLONS

UTILITIES	.0169
LABOR, SUPPLIES, OVERHEAD, (3)	.0125
CARBON MAKEUP	.1382
MAINTENANCE & INSURANCE, (3)	.0149 — 0.1825
AMORITIZATION@ 8.7%/YEAR	.0250
TOTAL OPERATING COST	.2075

VOLUME OF CARBON IN INITIAL FILL, CU.FT.	34814
WEIGHT OF CARBON IN INITIAL FILL, LBS.	818152
BED DEPTH, FT.	7
CROSS SECTIONAL AREA OF FLOW, SQ.FT.	4959
REGENERATION RATE, LBS./DAY	189797
CARBON DOSAGE, LBS./1000GAL.	7.59

CONTACT FLOW RATE IS 7.00 BED VOLUMES/HOUR

FIXED INVESTMENT, (1), $

INSTALLED COST	1683207
CARBON COST, (2)	328813
TOTAL	2012020

OPERATING COSTS, $/1000 GALLONS

UTILITIES	.0169
LABOR, SUPPLIES, OVERHEAD, (3)	.0115
CARBON MAKEUP	.1382
MAINTENANCE & INSURANCE, (3)	.0119
AMORITIZATION@ 8.7%/YEAR	.0200
TOTAL OPERATING COST	.1984

VOLUME OF CARBON IN INITIAL FILL, CU.FT.	19894
WEIGHT OF CARBON IN INITIAL FILL, LBS.	467515
BED DEPTH, FT.	4
CROSS SECTIONAL AREA OF FLOW, SQ.FT.	4959
REGENERATION RATE, LBS./DAY	189797
CARBON DOSAGE, LBS./1000GAL.	7.59

(1) SYSTEM INCLUDES ADSORPTION AND REGENERATION FACILITIES, BUT NOT LAND, BUILDING, OR FACILITIES WHICH MAY BE REQUIRED FOR PRETREATING THE WASTE PRIOR TO ADSORPTION SUCH AS FILTRATION AND CLARIFICATION.
(2) CARBON COSTS ARE FOR INITIAL FILL AND TWO MONTHS OPERATING SUPPLY AT 7% MAKEUP USING AN ESTIMATED CARBON COST OF $ .26 /LB. DELIVERED.
(3) BASED ON MEK RECOMMENDATION IN TWRC-11.
(4) 20-YEAR LIFE WITH 6%INTEREST/YEAR.

TIME 2 SECS.

EXHIBIT E

ACTIVATED CARBON REGENERATION EXPERIMENT
SPENT CARBON FROM SAUGET, ILL. PROJECT

Figure 1 shows the laboratory set-up used for collecting spent granular carbon regeneration data. A Burrell high temperature electric furnace was used for heating the spent activated carbon. This electric tube furnace is designed for continuous operation up to 1400°C.

Dry spent activated carbon was placed in the porcelain boat and (the boat was pushed in the middle of ceramic tube) after the electric furnace had reached about 915 to 920°C. Carbon was heated for about 30 minutes while nitrogen was passed through the tube at the rate of 2 SCFH. The off-gas was sparged into (2N) NaOH solution to determine chlorides, sulfates, and total organic carbon (TOC). The off-gas was also condensed in a glass "U" tube for the qualitative analysis of off-gas. The results of the experiments and pertinent data are listed in Tables 1 and 2.

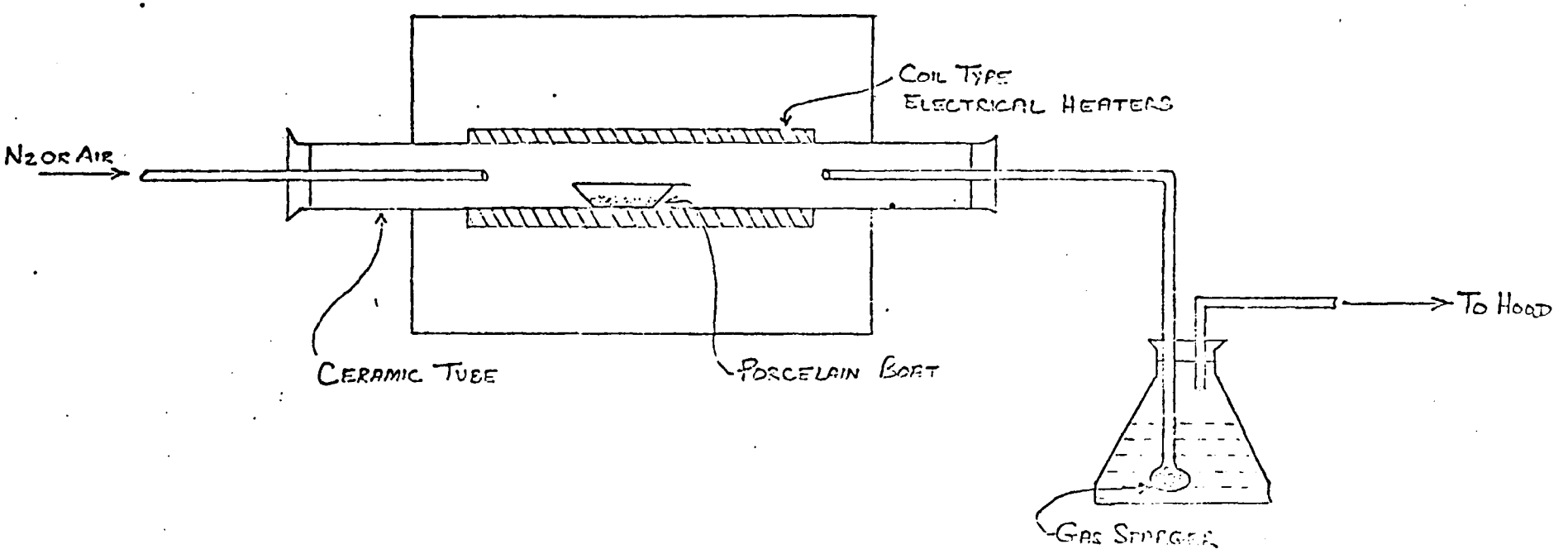


Figure 75 Schematic Regeneration Apparatus

Table 94

EXPERIMENT 1. CARBON REGENERATION

Sample: Spent Carbon from Sauget, Illinois project

% Moisture: 44.52 (103°C)

Regeneration Temperature: 910-920°C

Regeneration Time: 30 minutes

Weight of Spent Dry Carbon: 4.9725 g

Weight of Regenerated Carbon: 4.3040 g

Weight Loss: .6685 g

Percent Loss (Organics): 15.52%

Sparging Gas: Nitrogen, 2 cfh

Scrubbing Solution: 2N NaOH

Total Organic Carbon Recovered in Caustic: .058 grams

Chloride Recovered in Caustic: 52.0 mg

Sulfate Recovered in Caustic: Trace

Iodine Number of Regenerated Carbon: 696 mg I_2/g Carbon

Table 95

EXPERIMENT 2. CARBON REGENERATION

Sample: Spent Carbon from Sauget, Illinois project

% Moisture: 44.52 (103°C)

Regeneration Temperature: 910-920°C

Regeneration Time: 30 minutes

Weight of Dry Carbon: 5.0520 g

Weight of Regenerated Carbon: 4.4825 g

Weight Loss: .5685 g

Percent Loss (Organics): 12.68%

Sparging Gas: Nitrogen, 2 cfh

Scrubbing Solution: Liquid Nitrogen

Organics Recovered:* Phenol, Benzonitrile, Chloroaniline

Iodine Number of Regenerated Carbon: 670 mg I_2/g Carbon

*Organics identified by Mass Spectrometry

EXHIBIT F

TABLE 96

MASTER DATA TABLE

ACTIVATED CARBON SYSTEM

Day Number	Date	Flow Rate l/min.	Total Volume gal.	GPM/ft.²	Bed Volumes/hr.	Column I BOD5*	Column I COD*	Column I TOC*	Column I Color (APHA)	Column I Phenol*	Column II BOD5*	Column II COD*	Column II TOC*	Column II Color (APHA)	Column II Phenol*	Column III pH	Column III Temperature (°F)	Column III BOD5*	Column III COD*	Column III TOC*	Column III Total Solids*	Column III Suspended Solids*	Column III Dissolved Solids*	Column III Phenols*	Column III Oil*	Column III Kjeldahl N.*	Column III Color (APHA)	Column III Odor	TIME
1	5/9	1.4					55		10			40		0															10 AM
1	5/10	1.4																											5 PM
2	5/11	1.2	490				50		10			6.9		10		8.1	74		5.8							10			9 AM
2	5/11	1.4	534																										10 AM
2	5/11	1.35	675																										1:30 PM
3	5/12	0.5	923				110		70			50		10		8.3	64		8.0							10			1:30 PM
3	5/12	1.3	535				50		200																				11:30 AM
3	5/12	1.1 2.5	1030				201		200																				1 PM
4	5/13	0.6 1.3	282				154		200			108		10		8.4	6		9.9							10			9 AM
4	5/13	1.3 2.8	331				190		250																				2 PM
5	5/14	0.5 1.1	472				178		250			120		10		8.4	3		8							10			4 AM
5	5/14	1.3 2.8	823				206		250																				4 PM
6	5/15	0.8 1.7	2116				132		250			99		10		8.5	74		61							10			9 AM
6	5/15													90															2:30 PM
6	5/15													80															3:30 PM
6	5/15	1.3 2.8	2764				223		300					150															4 PM
7	5/16	0.8 1.7	2567				254		250			1246		150		8.6	77		180							20			9:30 AM
7	5/16	1.3 2.8	2933				300		390																				2:30 PM
8	5/17	1.0 2.2	3027				300		450			221		250		8.6	80		119		3553			0.15		50			1:30 PM
9	5/18	1.0 2.2	3299				245		400			183		250		8.6	73		154							20			1:30 PM
9	5/18	0	3299																							80			1:45 PM
9	5/19	1.4	3382																							100			4 PM
10	5/20	0.5 1.1	3425				411		500			282		500			74		152							250			9:30 AM
11	5/22	0.5 1.1	3783				482		500			322		500		4.7			247					2.12		350			6:45 AM
11	5/20	0	3783																										10:00 AM
12	5/21	0.8 1.7	4170				369		500			336		500		10.0	74		263		3310	6				400			9 AM
12	5/21	0	4170																										4 PM

Run No. 1

Column Order C-4 C-5 C-6

Column	Bed Depth	Lbs. Carbon
I	4 ft.	8.3
II	4 ft.	8.3
III	3.7 ft.	7.7

*Values reported in mg/l.

TABLE 96

MASTER DATA TABLE

ACTIVATED CARBON SYSTEM

Day Number	Date	Flow Rate l/min	Total Volume gal	GPM/ft²	Bed Volumes/hr	Column I BOD5*	Column I COD*	Column I TOC*	Column I Color (APHA)	Column I Phenol*	Column II BOD5*	Column II COD*	Column II TOC*	Column II Color (APHA)	Column II Phenol*	Column III BOD5*	Column III COD*	Column III TOC*	Column III Color (APHA)	Column III Phenol*	Column IV pH	Temperature (°F)	BOD5*	COD*	TOC*	Total Solids*	Suspended Solids*	Dissolved Solids*	Phenols*	Oils*	Kjeldahl N.*	Color (APHA)	Odor	TIME
1	5/29	1.4	135				43					48					51							21										11 AM
1	5/29	1.35	250						10					10					10													10		4 PM
2	5/30	.6	377						10					10					10				54	4										9 AM
	5/31	0	377																				38	0										
3	6/1	.33							250					10					10		8.2		45	0								10		11:30 AM
4	6/2	.54 / 0	1118				109		300			9		10			0		10		5.3		66	0								10		8:45 AM
4	6/2	0 / .5	1118																															10:15 AM
5	6/3	.54 / 0																																9 AM
5	6/3	0 / .33																																5:30 PM
6	6/4	1.2 / 1.4							>500					50					10				15									10		9 AM
6	6/4	1.22	2108									55												0					.1					2 PM
7	6/5	1.0 / .1					488		450			183		150			19		10		8.0	80	13	68					.15			10		9 AM
7	6/5	.03 / 3	4484																															4 PM
8	6/6	.68 / .76					262		>500			183		500			144		90		7.8		20	46								10		9 AM
8	6/6	1.14	2846																		7.8													4 PM
9	6/7	1.0 / .95					355					275					104				9.2		57	92			11				57			9:30 AM
9	6/7	.26 / .52	3179																					165										4 PM
10	6/8	.25 / .27	3569				299		>500			217		>500			101		100				59	194								20		9 AM
10	6/8	0	3569																															10:45 AM
10	6/8	1.3	3569																															12 noon
11	6/9	1.17 / .34	4037				253		>500			274		500			224		400		8.5		42	164								30		9 AM
12	6/10	1.13 / 1.25	4381				272		>500			228		500			186		400		8.8		44	111								100		9 AM
13	6/11	1.62 / 0	4891				283		>500			245		>500			238		500					152								50		9:30 AM
13	6/11	0 / 1.20	4891																															1:30 PM
14	6/12	1.22	5285				228		>500			238		>500			211		>500			77		128								100		9 AM
15	6/13	1.15 / 1.3	5758				289		>500			296		>500			253		>500					185								300		9 AM
16	6/14	1.2 / 0					414		>500			460		>500			520		500					311								500		10 AM

*Values reported in mg/l.

Run No. ____________

Column Order ______ ______ ______

Column	Bed Depth	Lbs. Carbon
I	3' 11"	8.2
II	3' 8½"	7.7
III	3' 6½"	7.4
IV	3' 6½"	7.4

TABLE 96

MASTER DATA TABLE

ACTIVATED CARBON SYSTEM

Day Number	Date	Flow Rate l/min.	Total Volume gal.	GPM/ft²	Bed Volumes/hr	Column I BOD5*	Column I COD*	Column I TOC*	Column I Color (APHA)	Column I Phenol*	Column II BOD5*	Column II COD*	Column II TOC*	Column II Color (APHA)	Column II Phenol*	Column III BOD5*	Column III COD*	Column III TOC*	Column III Color (APHA)	Column III Phenol*	Column IV pH	Column IV Temperature (°F)	Column IV BOD5*	Column IV COD*	Column IV TOC*	Column IV Total Solids*	Column IV Suspended Solids*	Column IV Dissolved Solids*	Column IV Phenols*	Column IV Oils*	Column IV Kjeldahl N.*	Column IV Color (APHA)	Odor	TIME
1	[illegible]	[illegible]																																
2	6/17	.42																			7.3													6 AM
2	6/-	.68					-5	10			25	40	10			42	0					25	19								10			10 AM
3	6/19	.32					159	10			20	08	10			90	0				7.2	20	27								10			10 AM
3	6/18	.42																																4 PM
4	6/19	.54																																6 AM
5	6/20	.51																																9 AM
6	6/21	.78																																1 PM
7	6/22	0						125					10				0					18									10		9 AM
7	6/22	.55																											.05					3 PM
7	6/22	.6						125					10				10															10		5 PM
8	6/23	0					134	200			117		10			102	10				7.6		47								10		8 AM
9	6/24	0					142	150			118		10			105	10				7.6		94								10		9 AM
9	6/24	.35																																3 PM
9	6/24	.45																																
10	6/25	.37					205	300			131		10			85	10				7.5	7.5	85								10		9 AM
11	6/26	.64					283	450			1236		20			1127	10				7.6		111								10		9 AM
11	6/26	.72																					6											2 PM
12	6/27	0					276	450			140		20			5 144	10						91								10		10 AM
12	6/27	.7																					5											4 PM
13	6/28	0						250					50				10				7.8	30									10		9 AM
14	6/29	0						450					70				10					10	120								20		11 AM
15	6/30	0						400					40				10				7.5										20		9 AM
16	7/1	0					328	500			105		45			59	10				7.5		105								20		9 AM
17	7/2	.19									108		300			47	20						66								20		1 PM
17	7/2	.42																																7 PM
18	7/3	.48						>500					500				80														40		9 AM
19	7/4	0						350					50				20				8.1	3									40		9 AM
19	7/4	.45																																12 noon

Run No. _____

Column Order _____ _____ _____

Column	Bed Depth	Lbs. Carbon
I		8.0
II		8.0
III		8.0
IV		8.0

Values reported in mg/l.

TABLE 96

MASTER DATA TABLE

ACTIVATED CARBON SYSTEM

Day Number	Date	Flow Rate l./min.	Total Volume gal.	GPM/ft.^{2}	Bed Volumes/hr.	Column I					Column II					Column III					Column IV												TIME
						BOD 5*	COD*	TOC*	Color (APHA)	Phenol*	BOD 5*	COD*	TOC*	Color (APHA)	Phenol*	BOD 5*	COD*	TOC*	Color (APHA)	Phenol*	pH	Temperature (°F)	BOD 5*	COD*	TOC*	Total Solids*	Suspended Solids*	Dissolved Solids*	Phenols*	Oils*	Kjeldahl N.*	Color (APHA)	Odor	
20	7/5	1.0							250					60					20		7.1	71									10		9 AM
20	7/5	1.0																															3:30 PM
21	7/6	1.0										307					169				7.7			47							10		9 AM
21	7/6	1.0																															11:30 AM
21	7/6	1.0																															2 PM
22	7/7	1.0										83					113						26	98									9 AM
22	7/7	1.0																			8.4		44										4:30 PM
23	7/8	1.0					295		300			207		100			170		80		7.7			44							20		9 AM
23	7/8	1.0																					45										5 PM
24	7/9	1.0							400					250					90		8.0										40		9 AM
24	7/9	1.0					326					196					149							113									2 PM
24	7/9	1.0																					102										4:30 PM
25	7/10	1.0					319					351					277				8.1		90	133									8:30 AM
25	7/10	1.0																															2:30 PM
25	7/10	1.0																															5 PM
26	7/11	1.0																			7.4		52	205							90		9 AM
26	7/11	1.0																															5 PM
27	7/12	1.0							300					300					200		7.7		46	258							60		8:45 AM
27	7/12	1.0																															4 PM
28	7/13	1.0					287		300			300		400			251		250		7.8		30	182							100		8:45 AM
28	7/13	1.0																															4 PM
28	7/13	1.0																															11:30 PM
28	7/13	1.0																															5 PM
29	7/14	1.0					242		300			278		300			270		300		7.9		49								150		9 AM
29	7/14	1.0																					90										4 PM
30	7/15	1.0					291		400			265		400			320		400		8.0		83	228							150		9 AM
30	7/15	1.0																															5 PM
31	7/16	1.0					344		400			248		300			277		300				102	217							250		9 AM
31	7/16	1.0																					94								300		4 PM

Run No. _____
Column Order _____ _____ _____

Column	Bed Depth	Lbs.Carbon
I		
II		
III		

*Values reported in mg/l.

EXHIBIT H

12-081

FIGURE 76

SAMPLE MIDWEST RUBBER COMPOSITE VALUE
COD mg/l

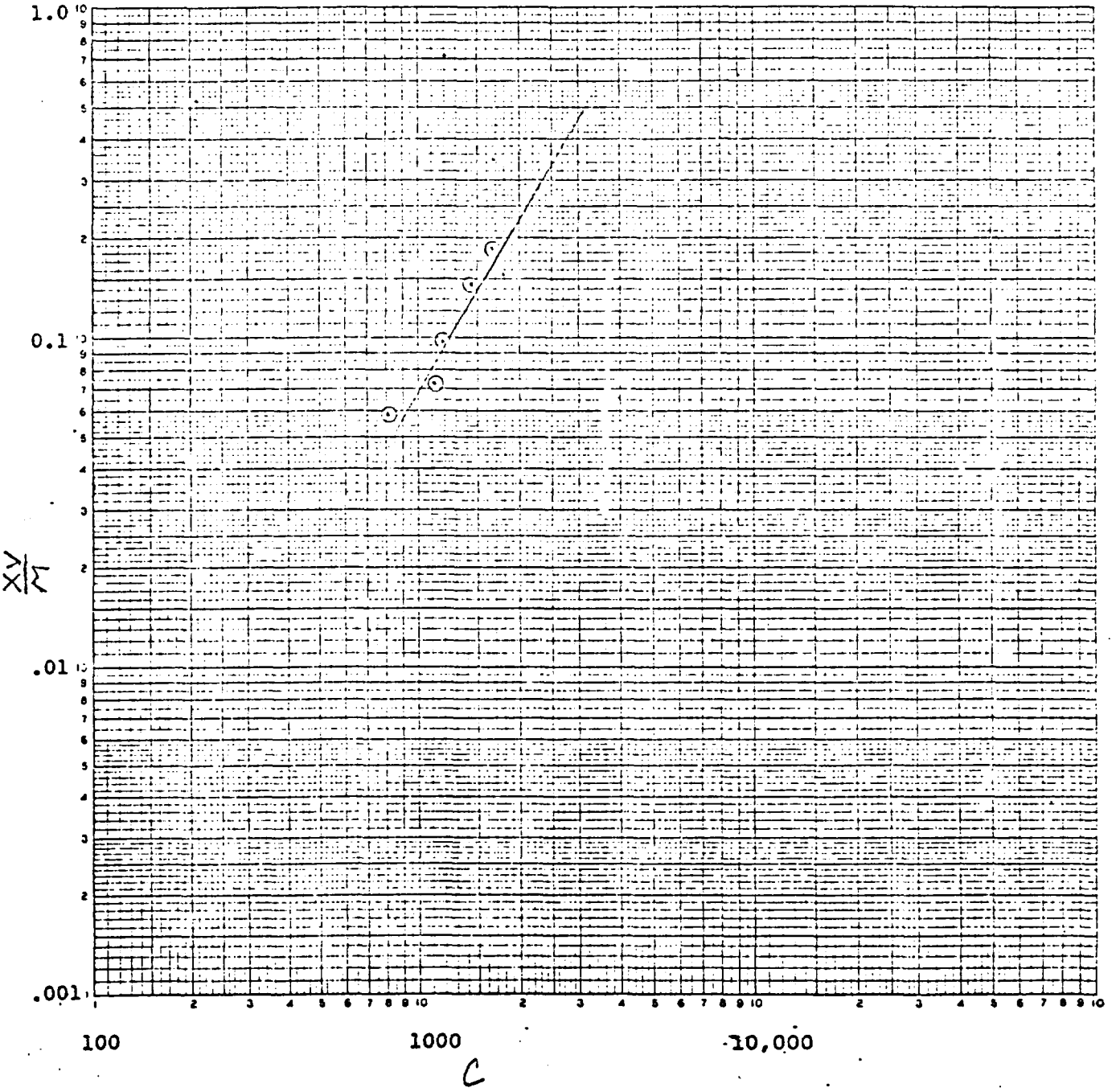
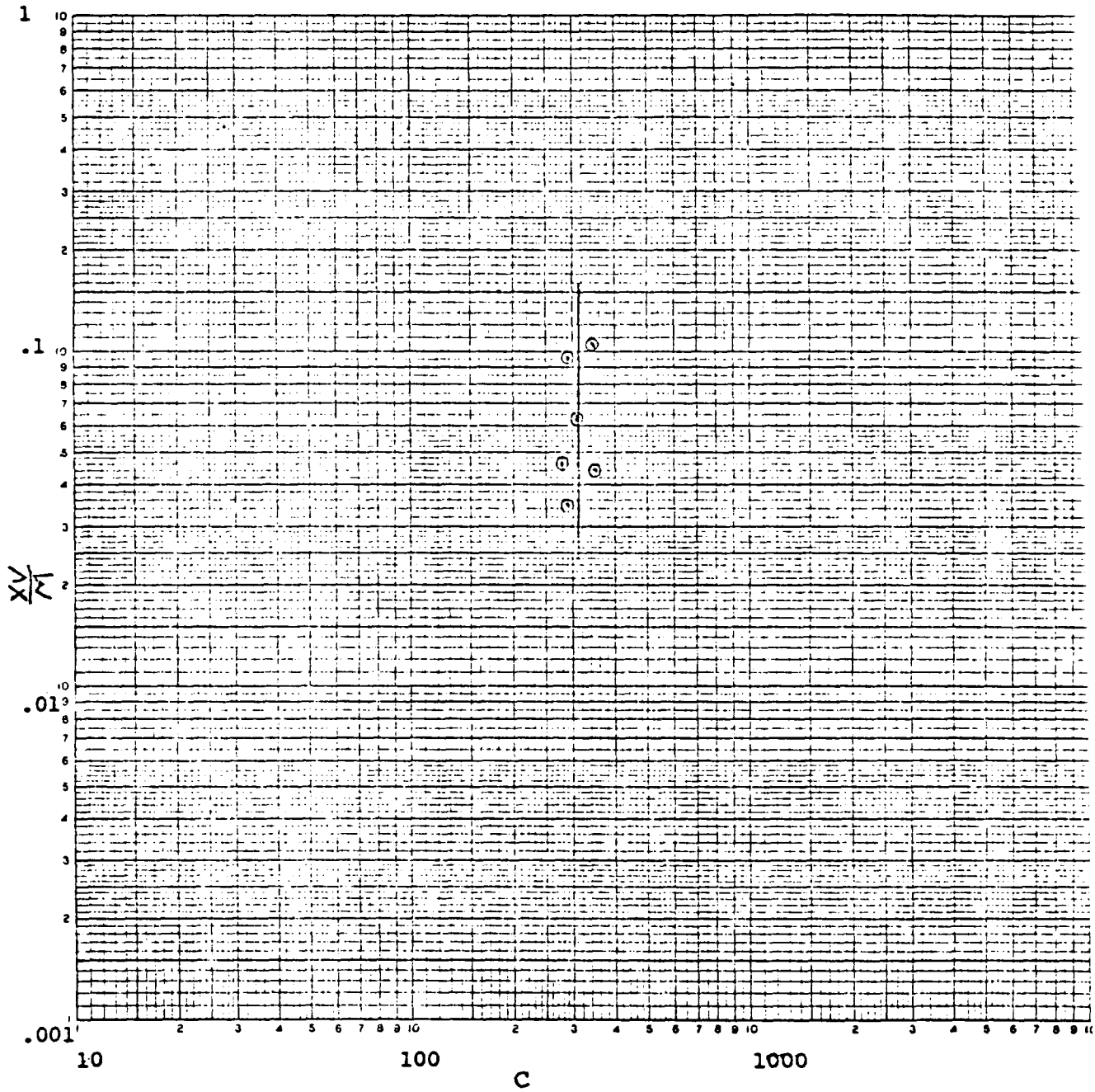


FIGURE 77

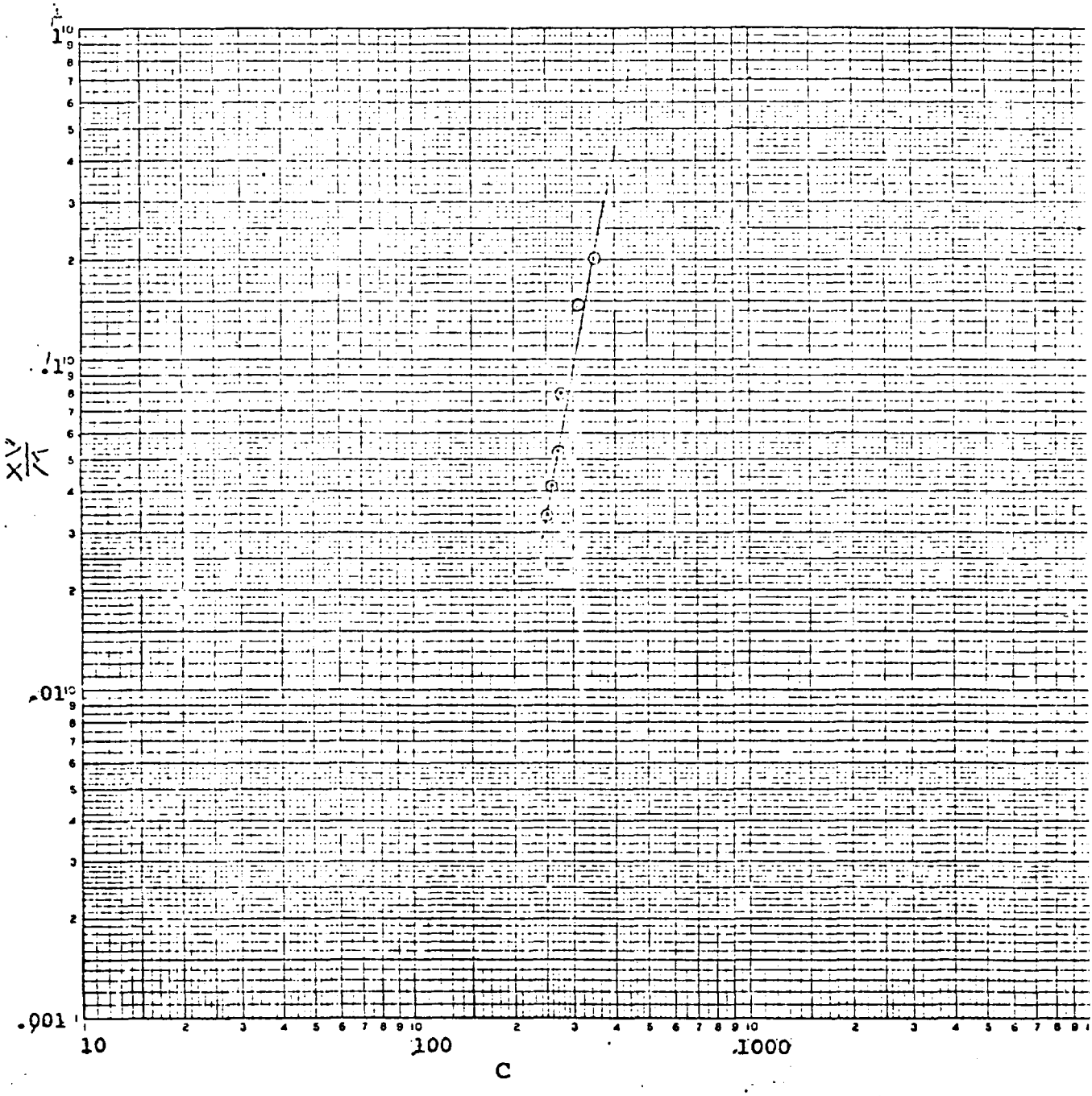
SAMPLE EDWIN COOPER EAST COMPOSITE
VALUE COD mg/l



Full Logarithmic, 3 × 3 Cycles

FIGURE 78

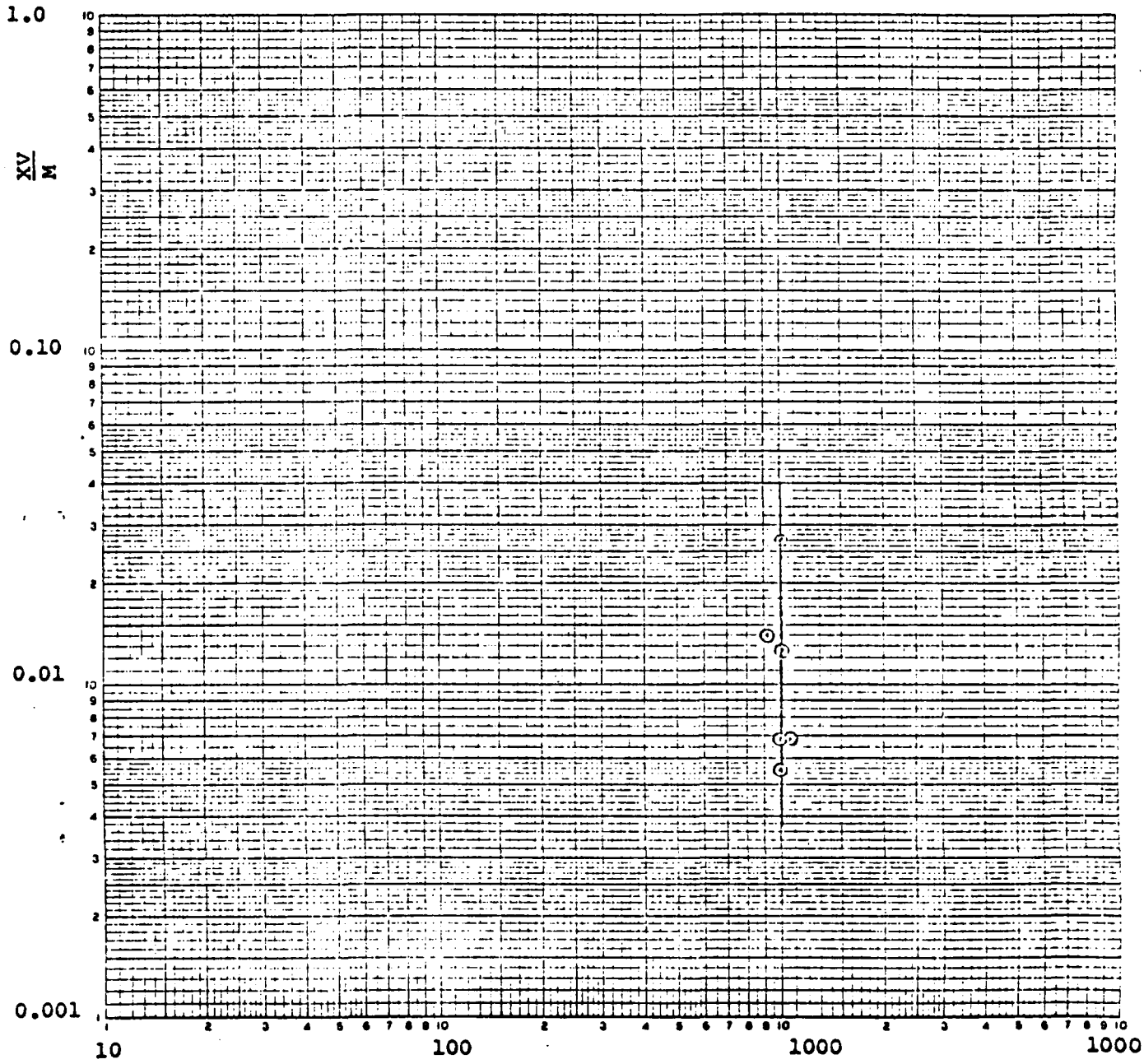
SAMPLE EDWIN COOPER WEST COMPOSITE
VALUE COD mg/l



DEPARTMENT: 273 - ODCB

FIGURE 79

VALUE: COD mg/l



C

DEPARTMENT: 222 - PNA

FIGURE 80

VALUE: COD mg/l

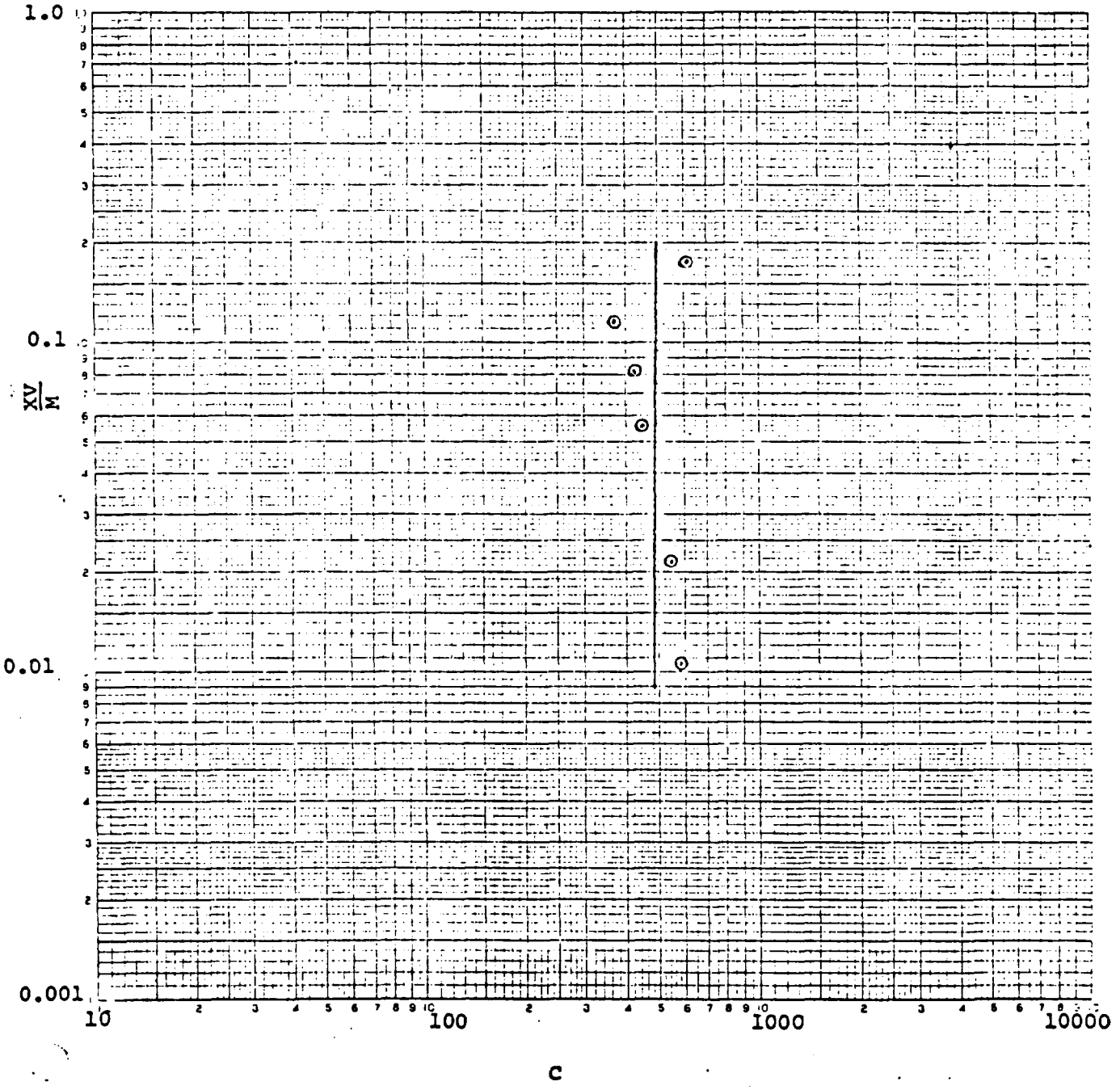
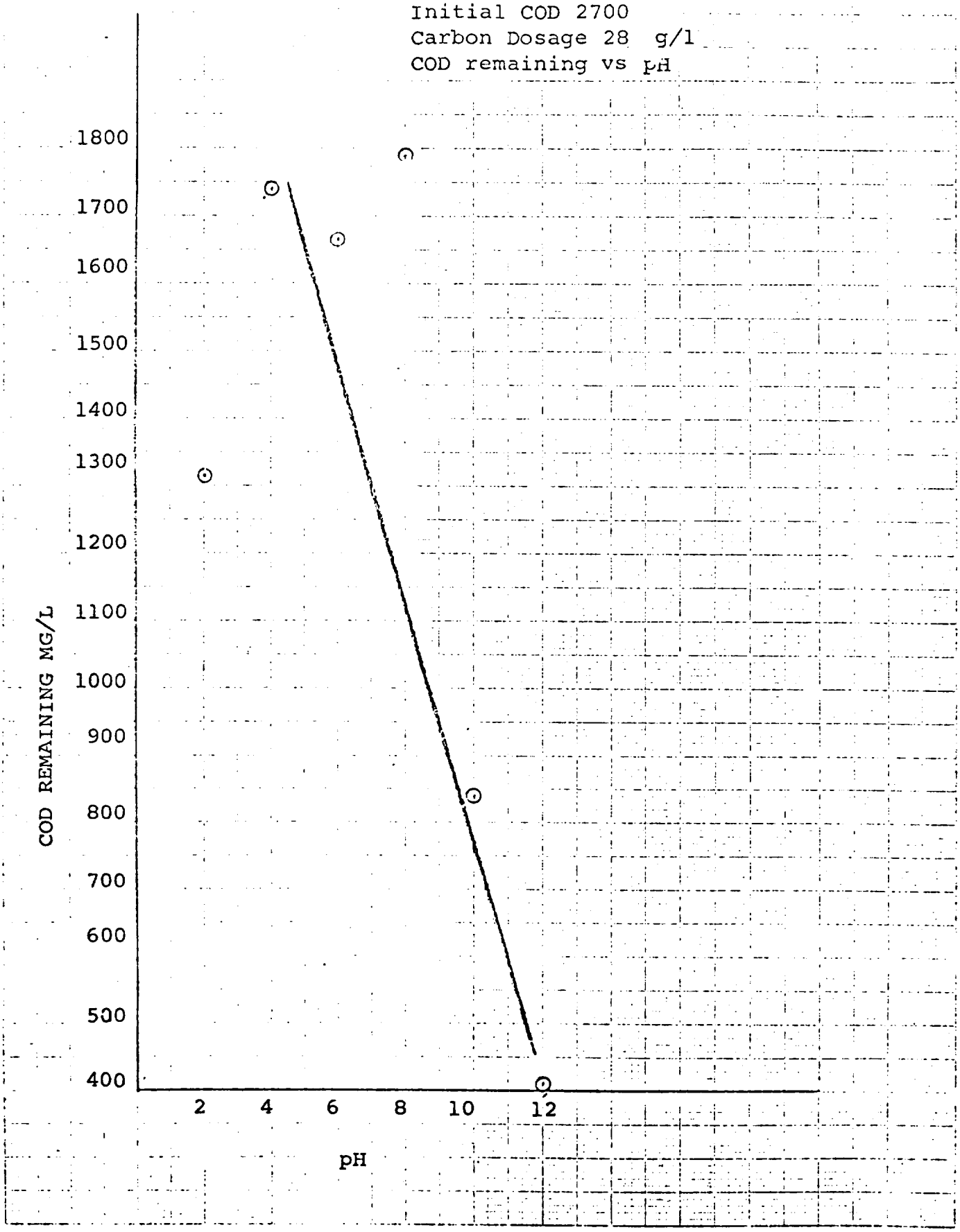


FIGURE 81

ADSORPTION STUDY

pH STUDY OF A PNA WASTE



APPENDIX XII

FILTRATION

FILTRATION

Objective:

[illegible] reduce the chemical system effluent suspended solids levels [illegible], and the [illegible] carbon column operation due to suspended solids build-up in the bed necessitated the investigation of filtration as a suspended solids removal technique. A multimedia filter was acquired for this purpose.

Equipment Selection and Description

A small pilot multimedia filter was leased from Neptune Microfloc, Inc. (See Figure 82 for a schematic drawing of the experimental apparatus.)

The multimedia filter was selected instead of single or dual media filters. The reasons for this choice are shown in Figure 83. In the first two drawings the pore size is observed to increase downward through the bed. The major portion of the particles filtered by beds of these types would be retained in the uppermost fraction of the bed causing a rapid solids build-up on the bed surface. The total quantity of solids retained would therefore be low in comparison with the total bed depth (or volume). This problem may be overcome by using a three (or more) media filter with materials of decreasing particle size with increasing specific gravity. The higher density of the smaller particles prevents stratification with the smallest pore size at the filter surface. A multimedia filter therefore makes more efficient (in terms of solids retained per unit area or volume of the filter) use of the filter bed by allowing deeper and more extensive penetration of the bed by the solids loaded onto it. The layering of the larger particles on smaller particles in the filter will remain intact after backwashing because of the increasing particles specific gravity with decreasing mesh size. The filter can be adapted to differing applications by varying the relative amounts of each medium, i.e., more coal would increase the solids retention capacity and more sand or garnet would increase the filter's ability to remove fine particles.

The use of multimedia filters in an industrial application necessitates pilot plant experimentation for system design, because of the highly variable nature (i.e., concentration, particle size, floc strength, particle density, etc.) of the suspended solids encountered.

Experimental Procedure

Five experimental runs were conducted using the multimedia filter (total bed depth of 30 inches). The bed was made up of 18 inches of 10 X 20 coal (Sp. gr. 1.6), 9 inches of 20 X 40 sand (Sp. gr. 2.6) and 3 inches of 40 X 80 garnet (Sp. gr. 4.2). The waste was fed to the column at three different controlled flow rates. The raw feed and filter effluent suspended solids along with the differential pressure across the filter were measured hourly. The filter was operated until a selected differential pressure (3psi) was reached. The column was then backwashed.

For four of the experimental runs, chemical system effluent was used as the raw feed; the fifth run used neutralization tank effluent.

Discussion of Test Results

Table 97 summarizes the data gathered during the five experimental runs. Figures 84 through 88 show plots of pressure head loss and effluent suspended solids versus run time for the various experimental runs. These plots were used to determine the filtration feasibility and to select the optimum system design parameters. Of the four runs made on the chemical system effluent, the one at 3 gpm/ft^2 appears to show the best performance in terms of the length of the run during which the suspended solids remains below 25 mg/l and the rate of pressure build-up

The experiments conducted at the higher flow rates show the effluent suspended solids levels to reach 25 mg/l before the terminal pressure drop is reached. The terminal pressure drop being the maximum pressure drop allowable across the columns before backwash, in this case 3 psi.

The experiment conducted at 3 gpm/ft^2 shows the suspended solids levels on the average to be below 25 mg/l. At three gpm/ft^2 flow the average run time can be expected to be 24 hours. The backwash flow rate should be 17 gpm/ft^2 with a 1 gpm/ft^2 surface wash. The surface wash aids in the agitation of the media during backwash and breaks up large chunks of surface material which can accumulate. These surface wash and backwash flow rates are the standard rates recommended by Neptune Microfloc for this type filter. Comparing the solids loading figures for the various runs can be deceiving because of the varying amounts of solids processed. The solids processed by runs 2 and 3 are higher than would be expected under normal conditions; however, during run two, the solids level dropped to what could be considered as normal. Normal suspended solids levels for the pilot plant are expected